EDISON ELECTRIC INSTITUTE BULLETIN

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EDISON ELECTRIC INSTITUTE

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled Monthly by the Edison Electric Institute—Covers 100% of the Industry

DURING THE MONTH OF AUGUST

	1937	1936	%
Kilowatthours Generated* (net)			
By Fuel	7,070,637,000	6,412,827,000	+10.3
By Water Power	3,028,404,000	2,752,734,000	+10.0
Total Kilowatthours Generated	10,099,041,000	9,165,561,000	+10.2
Additions to Supply			
Energy Purchased from Other Sources	292,858,000	150,298,000	+94.9
Net International Imports	109,907,000	116,001,000	− 5.3
Total	402,765,000	266,299,000	+51.2
Deductions from Supply			
Energy Used in Electric Railway Departments	43,125,000	41,436,000	+ 4.1
Energy Used in Electric and Other Departments	107,020,000	114,451,000	− 6.5
Total	150,145,000	155,887,000	− 3.7
Total Energy for Distribution	**10,351,661,000**	**9,275,973,000**	**+11.6**
Energy Lost in Transmission, Distribution, Etc.	**1,706,738,000**	**1,552,560,000**	**+ 9.9**
Kilowatthours Sold to Ultimate Customers	**8,644,923,000**	**7,723,413,000**	**+11.9**
Sales to Ultimate Customers (kwhrs)			
Domestic Service	1,381,889,000	1,179,829,000	+17.1
Commercial—Small Light and Power (Retail)	1,538,853,000	1,360,637,000	+13.1
Commercial—Large Light and Power (Wholesale)	5,071,578,000	4,487,257,000	+13.0
Municipal Street Lighting	153,833,000	187,965,000	−18.2
Railroads—Street and Interurban	326,464,000	340,066,000	− 4.0
Railroads—Electrified Steam	96,633,000	97,174,000	− 0.6
Municipal and Miscellaneous	75,673,000	70,485,000	+ 7.4
Total Sales to Ultimate Customers	8,644,923,000	7,723,413,000	+11.9
Total Revenue from Ultimate Customers	$182,057,200	$169,636,200	+ 7.3

DURING TWELVE MONTHS ENDING AUGUST 31st

Kilowatthours Generated* (net)			
By Fuel	73,792,220,000	64,830,631,000	+13.8
By Water Power	40,240,940,000	36,274,322,000	+10.9
Total Kilowatthours Generated	114,033,160,000	101,104,953,000	+12.8
Purchased Energy (Net)	4,167,583,000	3,266,481,000	+27.6
Energy Used in Electric Railway and Other Departments	2,116,934,000	2,179,367,000	− 2.9
Total Energy for Distribution	**116,083,809,000**	**102,192,067,000**	**+13.6**
Energy Lost in Transmission, Distribution, Etc.	**18,073,123,000**	**16,885,778,000**	**+ 7.0**
Kilowatthours Sold to Ultimate Customers	**98,010,686,000**	**85,306,289,000**	**+14.9**
Total Revenue from Ultimate Customers	**$2,158,757,800**	**$2,002,614,800**	**+ 7.8**
Important Factors			
Percent of Energy Generated by Waterpower	35.3%	35.9%	
Domestic Service (Residential Use)			
Average Annual Consumption per Customer (kwhr)	777	705	+10.2
Average Revenue per Kwhr (cents)	4.49¢	4.82¢	− 6.8
Average Monthly Bill per Domestic Customer	$2.91	$2.83	+ 2.8

BASIC INFORMATION AS OF AUGUST 31st

Generating Capacity (kw)—Steam	24,100,415	24,079,100	
—Waterpower	9,521,547	9,011,800	
—Internal Cumbustion	614,763	499,400	
Total Generating Capacity in Kilowatts	34,236,725	33,590,300	
Number of Customers			
Farms in Eastern Area (Included with Domestic)	(863,605)	(641,407)	
Farms in Western Area (Included with Commercial—Large)	(302,400)	(236,638)	
Domestic Service	22,123,271	21,409,389	
Commercial—Small Light and Power	3,848,704	3,779,426	
Commercial—Large Light and Power	565,391	511,410	
Other Ultimate Customers	69,559	61,659	
Total Ultimate Customers	26,606,925	25,761,884	

* By courtesy of the Federal Power Commission, with deductions for certain plants not considered electric light and power enterprises.

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Volume 5 NOVEMBER, 1937 No. 11

Return On Investment

By C. W. Kellogg
President, Edison Electric Institute

A talk before the Indiana Electric Association Convention. French Lick, Ind., October 22, 1937

THE general theory upon which our State Commissions and Courts have proceeded for many years in the determination of fair rates for utility service has been that the rates so determined should be such as to reimburse the utility company for the cost of the service. The cost in question was made up of four factors:

1. The cost of labor and materials required to operate and maintain the physical properties and to run the business (Operation).
2. Taxes.
3. Provision for retirement of units of property withdrawn from service (Depreciation).
4. A return on the capital invested, sufficient at all times to attract new capital to the business.

For the last year for which combined figures are available, these four factors have divided the consumer's dollar in the following proportions: operation 38 per cent, taxes 15 per cent, depreciation 10 per cent, return 37 per cent. Since the last two items are of the same nature, we can make our statement still simpler by saying that approximately the customer's dollar goes 38 per cent for operation, 15 per cent for taxes and 47 per cent for the use of capital. In general, therefore, nearly half the cost of furnishing electric service consists of the return on the capital involved. This fact will not seem surprising when taken in connection with the further fact that the amount of capital required per dollar of annual gross earnings is seven times as great for electric utility service as for industry as a whole.

It should be pointed out at once that the reason capital costs represent nearly half the total cost is not because the rate of return on investment has been high, but because the relative amount of capital required is so great. The U. S. Census of Central Electric Light and Power Stations gives the following rates of return on investment in that business:

Census of	*Rate of Return*
1902	4.4%
1907	4.6%
1912	4.5%
1917	4.9%
1922	6.5%
1927	7.4%
1932	6.1%

In the view of a large section of the American people, in thinking about utility matters, there seems to be a tendency to feel that it is necessary and proper to pay for the current cost of labor and material which have to be purchased from day to day, but that they may forget or scorn the return to the people who have furnished the capital to make the whole thing go. For it must not be forgotten that until someone has first put up the money to build a utility plant no one can be employed to run it and no earnings can be obtained from it to pay for anything.

It may help our thinking about a return on utility investment to consider the case of some other form of property in general use. No one would seriously claim that he ought to be able to rent a house from a landlord by paying the maintenance charges and taxes, without any return on the owner's investment. Anyone knows that if landlords could not get a return on the investment in the houses they erect, the supply of houses would cease to hold out. Rent forms about 15 times as large an item in the average family budget as electricity, yet somehow many people have been asked to believe that the return on someone else's investment, which is admittedly and inevitably the largest part of house-rent, becomes an unholy thing when the money is invested in plant to produce electric service.

The same principle runs throughout our entire economic structure. Practically everything we buy costs an amount representing what the manufacturer had to pay for the same four components I mentioned a while ago as making up the cost of electric service. Every farm, mine or factory represents someone's capital, which its owner would not have put into the enterprise in question unless he believed that those who bought its product would pay, among other things, for a fair return on the use of his capital for that purpose.

It has for many generations been the case that those who have very little capital rail at paying others for the use of their capital, tending rather to glorify labor. This frame of mind, where it has existed, overlooks two fundamental points. First that, as in the case of the utilities, in our complex modern world, labor can find nothing at which to work until some capital has been transformed into plant to make labor productive; and second, that capital itself is nothing more than the saved-up labor of the past —that part of the product of past labor which its owner has had the self-denial and character to save and set aside for the use of others.

Anyone who, like myself, has lived for years in the relatively undeveloped parts of the country, knows from actual observation what capital hunger means to the small struggling community and how slow and painful the process is of getting those who possess this wonderful liquid labor (which can be transformed at will into useful wealth-producing

tools) to invest some of it in their midst. This sort of pioneering work, of getting capital from its large reservoirs in the centers of population to work in the more sparsely settled areas, has been peculiarly the task of the utility companies during most of their history. It has meant bringing useful and drudgery-saving electricity to millions of people in this country in communities whose economic status was such that they would not, but for the utility, have been able to get that service unaided.

The difficulty with getting the fair desserts of return on capital generally recognized rests on general human nature. As Dr. Holmes once expressed it, today's breakfast subtends a larger visual angle than yesterday's dinner; or, more recently, it has been observed that the public is grateful only for what it is about to receive. It is impossible to forget an obligation for payroll or material only a few weeks old, but it is easy to forget an obligation representing an investment of capital made perhaps many years ago. How can we most convincingly resolve this difficulty in the public mind? For the vast majority of people will decide a question fairly if they understand all the facts.

Surely nothing can be more basic than the Golden Rule, nor is the observance of anything more essential for the successful functioning of our modern complex civilization. Nothing short of the cooperation of all can furnish that security to life and property which is the essential purpose of the whole vast organism.

The United States has just adopted the Social Security Law, and how does it propose to provide for the security of the worker? By the time-tried method of setting aside each year a part of the worker's wages to create a fund for the future. This is a specific saving of a part of this year's labor, which, when so set aside, becomes capital or stored-up labor, from which support for the worker can be drawn in times of unemployment or in old age. Getting a return on the accumulations of this great capital fund is of the essence of the plan. Great and broad as this Social Security project is, it is no greater than the aggregate of what millions of individuals have done for themselves through voluntary saving through existing instrumentalities.

It has been estimated that by 1949 the funds under the Social Security Act will amount to 49 billion dollars, a figure larger by 12 billions than even our present unprecedented national debt. Yet this huge total is no greater than the totals of life insurance assets and other voluntary savings. In 1926, frequently cited as a normal year (p. 253 Statistical Abstract of the United States) there were 46,762,000 savings or other time deposits, with $24,696,000,000 on deposit. Building and Loan Associations had 10,666,000 members, with $6,334,000,000 of assets. Life insurance in force in the same year was $79,644,000,000, covering 25,500,000 ordinary and 78,000,000 industrial policies. Granting that there are many duplications among the members in these groups, there is none in the total saved-up capital involved, which was for these three groups about 44 billion in 1926 and nearly 52 billion dollars in 1935. It is interesting in passing to note the growth of 8 billion dollars in these savings of the millions during the period despite the depression.

On account of the unknown duplications in the figures that have been cited, it is not possible to state exactly what the savings in bank accounts, building and loan assets and life insurance amount to per person. The assets of building and loan associations are largely in dwellings of the members, but the assets of savings banks and life insurance companies are principally invested in securities on which a return is expected. It is doubtful if the average individual interest in these latter assets exceeds $1,000. It will help us in thinking of the sacredness of the obligation to pay a return on capital invested in the utilities to consider the individual $1,000 rather than the billions which these many one-thousands amount to in the aggregate. Almost anyone can visualize a thousand dollars; few can be very realistic about a billion.

Another angle from which the return on utility investment may be viewed, so as to be more easily seen, is to take the investment required to furnish electricity to the average dwelling. Analysis of the average demand made by the average of the 21,000,000 homes served in the United States shows that it amounts to but a fraction of a kilowatt and that the plant investment of the utility (in power station, substation, transmission and distribution) required to serve the average dwelling costs but $226. This is very much less than the average house owner has invested electrically on his own account in electric wiring, lighting fixtures, range, refrigerator, water heater or what not.

By breaking down our huge totals into units which the ordinary person can appraise and appreciate, we find that (averaging down the 8 billions of dollars that have gone into the electric utilities since 1922) $226 has been invested by neighbor Jones for neighbor Smith's electricity supply and that this is probably about 1/15th as much as someone has put up to buy the land and build the house Smith lives in. If Smith built and owns the house himself he knows he is paying (through loss of income on it) a return on the amount he put into the house plus taxes and maintenance, so that if neighbor Robinson built and owns the house, Smith knows he must pay Robinson as rent the same inevitable costs that arise from the use and maintenance of such property. Smith by the same logic should be perfectly willing to pay the charges for the use of the $226 neighbor Jones put up for Smith's electricity supply. Viewed on this individual basis, return on investment in the utility business should appear understandable and fair. It should also be helpful to reflect that the enormous total of investment in the electric utility business, as shown by the breakdown of life insurance and savings bank investments, is largely composed of the aggregate of the savings of many millions of neighbor Joneses (each average about $1,000) who, through these instrumentalities, have cooperated to bring electricity to the many millions of neighbor Smiths.

To make another simple breakdown, the average Mr. Smith paid the electric company $33.30 last year for his electricity. Deducting from this 63 per cent, which from our earlier analysis we found was required to buy materials, hire employees, run the business, pay taxes and provide for depreciation ($20.80), we have left $12.50 to pay a return on the $226 invested by neighbor Jones. This shows a 5½ per cent return on his investment. Certainly Smith should have no cause to feel that Jones has been overpaid in this transaction and possibly Smith ought to ponder the question of whether the rate of return is such that neighbor Jones will be ready to put more money into the business when in future more plant is needed either for additional service to neighbor Smith or for service to a new neighbor not now served.

This is far from being an idle inquiry. The only source of new capital is from the savings of the wages of labor or of the return on capital. The latter source

(*Continued on page* 480)

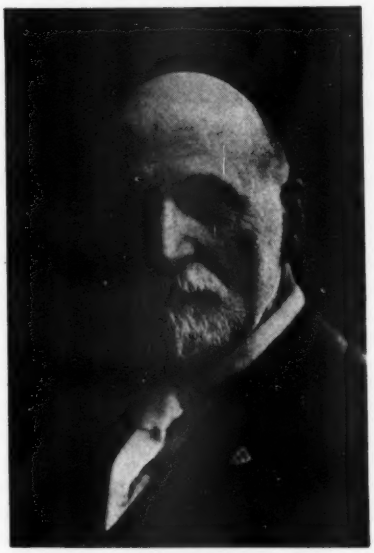
Some Puzzles Of A Public Utility Man

By Alex Dow
President, Detroit Edison Company

A speech delivered at the Convention of the Investment Bankers Association of America, White Sulphur Springs, W. Va., Nov. 4, 1937.

ACCORDING to the custom of these occasions, I have been introduced to you at such length as the time-table permits. To a few of you I need no personal introduction. To the larger number I am not a person but only a name—the name of the official head of The Detroit Edison Company, a corporation in the electric light and power business. I am not here to tell the story of my Company nor to publish its policies. I have been asked to speak to you as an everyday electric light and power man, still active, who saw the beginnings of the industry before he entered it, and who has been a part of it—making his living in it—doing his daily duty as laid upon him—for fifty years. In early years my day's work ended when the whistle blew. Now it ends when the next day's work begins. Responsibilities in succession have been placed upon me until I am the caretaker of nearly three hundred millions of other people's invested money; the chief of 8,700 employees, required to see that they work with efficiency and in contentment; and set to provide a service of the modern necessity which is electric supply, to more than 630,000 homes and business places and factories, spread over eleven counties and 7,587 square miles. That I am puzzled at times—and at many times—is inevitable. That my telling some of these recent puzzles may interest you, is my present hope.

Please do not assume that I was born into my industry with a silver spoon in my mouth. It was just the other way around. I went in with a kit of tools on my shoulder, claiming that I was a skilled wireman and enough of a lineman to scratch up a pole and to do the usual work on top thereof. My tools in the box were good, but soon I had to swap my eastern climbing spurs with their long gaffs for a pair of western spurs which could not graft me immovably into a cedar pole. I never qualified into the squirrel class as a pole climber, but I was a good wireman of that time, earning the top pay of those days, which



MR. DOW

was (if you please) three dollars for a ten-hour day. I had learned my trade as an incident of earlier telegraph employment. Still earlier I had been an Old World railway employee, nominally an office boy or junior clerk, but at every chance fussing around telegraph cabins and locomotive shops according to my inherited tendencies; and I had likewise been in shipping business where I found happiness in steamship engine rooms. Because of my knowledge of one certain phase of Atlantic shipping I was invited to accept my first employment in the United States. That job petered out and I dropped back into railroading—but all of that is another story and has no part in the present picture. What I ask you to take notice of is that I butted into the electric light and power business as a skilled workman, very inquisitive as to its methods and possibilities; that my employers early discovered and called on me to use my knowledge of Ohms Law and of the behavior of an inductive shunt, and such. Thereafter, increasing responsibilities were offered to me or laid upon me until I have all those just told to you.

In those fifty years I have met almost all the folks who created the industry. Of its pioneers, now gone, I valued the acquaintance and the good will of Charles Francis Brush, of Thomas A. Edison, and of Elihu Thomson. Of those others who early accepted the teachings of the pioneers—who put their inventions to use—who provided necessary capital out of their own funds or by persuasion of other people; those men who solved commercial problems and financial problems, not always wisely but ever with good intent—these builders of the industry—there are few whom I have not met. Many of them in their set time have gone across the River. Of their survivors and successors I have wished to keep their respect and have fairly succeeded therein.

To sum up what I have so far spoken—there have been few events of importance in the industry, few developments, few new departures, of which I have not known the origin, the sequence, and may have been able to identify the motives. What I ask you here to assume is that when I offer you a statement as a fact I speak with ample knowledge. When I offer opinions, notice that these are offered by a man who has seen the whole show and who has had his own part in it, though never a front-stage part. Such a part I have not desired, then nor now.

A while ago I described myself as still active. I would willingly in this second half of the seventy-sixth year of my life be less active. But my Directors have been pleased to remind me of the old saying adopted by Lincoln, that "It is not good to swap horses when crossing a stream." They applied the analogy of crossing a stream to this seven-year business period. That is much what it seems like. They look on me as an old horse, willing and wise as an old horse should be. This is not my first crossing of a stream of business depression, but it is the widest such stream in my memory and the ford is the worst marked and visibility is low. Wherefore I am permitted to be puzzled.

My 1786 edition of Dr. Samuel Johnson's dictionary defines the verb "to puzzle" as "to be bewildered in one's

own notions." It defines a puzzle as "an embarrassment; a perplexity." I accept the definitions. They are just *me* right now!

Here is Perplexity Number 1. It is demanded that I sell to the ultimate consumer as cheaply as possible. I am reproached if my prices are high. I am required to prove that my narrow margin of profit is needed to bring money into the business and keep it there. Nevertheless, I am required to collect a tax of 3 per cent of gross bills from my domestic and commercial consumers and pay it to the Federal Government. Puzzle out any consistency in these contrary requirements. Do I enjoy being a tax gatherer? I don't. And taxes are an increasing illogicality.

Number 2 puzzle is tied up with Number 1. I am told that certain Government operations are intended to be a yardstick whereby I must measure my possibilities of costs and service. Their accepted costs are not the costs I am required to accept and publish. They omit taxation; they even forget to show certain Federal facilities granted to them out of tax moneys. I am compelled to allocate every chargeable cost to my electric business. They are so free from that requirement that where they have more than one function they charge electric costs to other functions, and in their allocations of investment they favor those functions which are supposed to be a yardstick for me, at the expense of functions which I do not assume and would not be permitted to assume. The allocation of costs of investment in the most notable yardstick operation, between flood prevention, navigation, and production of electric energy, is such as would not get past any straightforward public accountant. I surely am perplexed, when the set-up of the shining example which is set before me is such that no member of your Association would permit it to go past as justifying his approval of an offering to investors.

Another perplexity.—When published comparisons of my operations are made with others elsewhere, the comparisons invariably leave out essential factors. Thus — the public is told by self-appointed teachers that the difference between electric supply rates in Ontario, across the river from Michigan, from those in Michigan, is inexcusably great. It is implied that I do not know the costs and rates prevailing across the river —presumably that I have overlooked such an invited comparison. I haven't. The self-appointeds do not take the trouble to find out *why* the costs are different. I have done so ever since the Ontario show began. Those critics say the difference in taxes is a small matter. They say the preference in Ontario highways is another small matter. And they fail to say that the difference in wages and salaries which exists between Ontario and Michigan would, if it were applied to my payrolls, allow me to cut my selling prices handsomely. That difference is in wages, rather than salaries. When the other differences in costs, and taxes, and preferences are added thereto and applied to my costs, I know, and my critics ought to know (but do not desire to know) that the difference with which they find fault, could forthwith vanish. Coming nearer home—it is a favorite indoor sport of those critical people to compare the rate schedule of one power company with that of another. Such a comparison of residence schedules was printed the other day. I am naming no names and casting no aspersions, but the comparer figured that if a householder bought 390 kilowatt hours per month he would pay more under his existing schedule than he would if the other schedule were applied. That comparer omitted to say that customers using as much as 390 kilowatt hours per month are one-quarter of one per cent of all customers. I could do with a lot more of them than I have.

Another perplexity. Why is my industry still damned in Congressional speeches as a Power Trust? A seven-year Commission investigation failed to prove the existence of any such thing as a Power Trust. I speak with sufficient knowledge in saying that there never has been and could never have been a Power Trust since the day when certain early patents were successfully evaded, and surely never after the long ago time when those patents expired. Mr. Edison said that a United States patent was merely a license to go to law, and even in his day you could not have built up a Power Trust. The people running the business were and are the most individualistic bunch that I ever traveled with. I would be exceedingly sorry for any man succeeding in setting himself up as the boss of that dreamed-of Trust. I have been and still am sorry for some people who sought to build up far flung controls which were destined to fall apart by their own weight. As to bossing—I, myself, have bossed men since I was a 14-year-old—all sorts of bunches —foreign speaking laborers who were entirely too free with stilettos—two score or so of smart young people who thought that they were amateur actors good enough to be professional; and I have been chairman of committees within the industry which could only agree to disagree. Sometimes I got a committee to agree on the essential accuracy of the multiplication table, but there was always a committee member to insist that one or more of the ten commandments needed amendment. As for a Trust to boss the industry either by a dictator or by a governing board—it never could be done—and looking at my friends in the industry today, I know that it never will be done. Why then are we addressed by press and preacher and politician as if we were an organized industry, instead of being the entirely undisciplined aggregation that we are?

I have lost count of my told puzzles, but here is another. Just about twelve years ago I talked to an important trade association of ours about matters which touched upon holding companies, as follows:

"The position of the holding company today is getting to require a very exact definition and a very exact observance of not merely the law but the ethics. Those holding companies who have wisely restricted their dealings with their subsidiaries of controlled properties, first, to the receiving of a reasonable or liberal return for money invested and second, to the repayment to them of expenses incurred, or payment to them for specified service actually rendered and billed, are going to be in the happy position of not being subject to challenge; while those others whose relations are covered by a bunched amount of so much percentage of gross earnings, or other figures of that kind, are going to be required to go into details and give a trustee's accounting. That is perhaps prophecy and it may be prophecy of evil, because any surge of public opinion or of court precedents in such a direction is bound to have some of the characteristics of a tidal wave and do damage as it goes along."

Please notice the date of the warning —1925. My perplexity is that the whole trend of our laws and the good laws of other peoples, back to the day that Moses brought the tables of stone down from Sinai, has been to punish the guilty for faults found in them and to let the innocent pass free. A tidal wave of public opinion is bound to do unselected damage as it goes past, but a law sent to a parliamentary body for consideration and enactment should discriminate between the guilty and the guiltless. The Detroit Edison Company began as a holding company and operated conveniently as such for years, but from 1915 onwards it has worked in its own name, and the last vestiges of its original plan were easily wiped out before the Public

Utility Act of 1935 went into effect. The holding company financial structure had merit—its use was ideal in many cases. It still might be useful in our industry. But why wipe out a whole class of economic structures honest and otherwise, to permit control, or possibly punishment of some offenders? I give it up!

And are we to have a new theory of regulation in our industry, and apparently in other industries, which will establish control of the kind the old salt described as "Navy Rules"? He said, "In this man's navy you don't do nuthin' 'til you're told, and then you do it damn sudden." Maybe so, but I hope not.

To what end is business being guided, anyhow? Is investment of their moneys or speculation for profit to be made safe for the stupid and for those overwise in their own conceits—by policing every traveler on that road? Are we to mark the way of the Lord through business laws and ethics according to the specifications of the prophet Isaiah—so that warfaring men, though fools, shall not err therein? Maybe so. But I have not yet had a release to announce that Isaiah's way of the saints is to be surveyed and staked out through the New York Stock Exchange as a Federal project. Myself, I have never been able to suffer fools gladly. I would rather let them be taught by experience and have them thereafter stay off the road going down from Jerusalem to Jericho, where a certain man fell among thieves. That road was badly patrolled. Let us patrol well our Twentieth Century business highway! Let us crucify the thieves, as Pontius Pilate would have done had he been attending to his job! But do not ordain that everyone moving along on his lawful occasions shall conform his pace to that of the slowest and worst-equipped blunderer. Life is much too short for that.

These puzzles told to you are not all of those which unduly exercise my personal I.Q. I have a score of others. For some of these I begin to see the answers. For others, I know what my next move must be, and that is sufficient unto the day. But in talking to this particular audience I must repeat that these now set forth are my own puzzles, personally, and that much of the puzzling is evidently academic. To put it in the vernacular—to find the answers is not my scrape. Time and happenings and the grace of God are the best solvers of puzzles. One must leave much to these, if he is not to worry himself into premature senility.

To this audience, further, I must needs again say that these muddles I have mentioned trouble only lightly or not at all The Detroit Edison Company. We took our Company out of the holding company class in good time, and inasmuch as our subsidiaries were always entirely owned, and never retained as active corporate entities longer than was helpful, each change was made without breaking step. To some extent because of watchful foresight, but more to our adherence of fifty years to definite policies, none of the new requirements laid upon us have been intolerable. Even the N.R.A. of blessed memory was something for which we were ready. We put our people on the 40-hour week in the summer of 1932, a year before the Blue Eagle was hatched. Our established wage minima were above those required by the Draft Code of 1933-34 in the making of which our industry wrangled for many months and which in the end the President did not sign. His reason for not signing is something concerning which I may have a guess but surely have no knowledge. The one problem which that Code brought to us was whether we would schedule some twenty messenger boys as drawing pay less than the junior clerk minimum because of their ages and character of their employment. Our decision made in five minutes was that we would raise the pay of those boys to the junior clerk minimum, and tell them that they had better earn the increase. They did.

As to complex accounting—we have wound up twelve corporations which we acquired in one way or other. We called and paid off all their debts except a small non-callable remainder, and paid off also the preferred stock of one. We spread the property of these corporations upon our books in the proper inventory accounts, and set aside the excess of the paid price as an item to be wiped out some good day. That fashion of recording purchased properties has been applied likewise to seventeen municipal plants. These as a class were neither better nor worse than the others, although of some of them the only thing which we retained for our own operation was the list of customers.

The debt of the wound-up companies, together with our own original bond issue making a total of over eighteen million dollars, has not been made the occasion for any issue of capital. According to custom, called and canceled underlying bonds could have been the basis of new bonds. But no bond has been issued excepting under the Trust Deed provision for issue against a percentage of new construction. The actual new construction under the terms of the Trust Deed would now permit the issue of another fifty-three millions, so that we certainly have not crowded our financial facilities—neither are we a bit likely to crowd them. We have had three refunding operations, in each instance bond for bond and at a net saving of interest.

The new accounting system which is being wished upon us for next year will make us additional expense in the General Accounting Department, but compel no novel routine. The increase by the Interstate Commerce Commission as of November 1, of the freight on coal, will add $180,000 to our annual expenses. The Guffey Act increase in coal prices, long hanging over us and likely to take effect about New Year, may mean three or four times as much increased costs as the new freight rate.

At the 40-hour week, our people are with few exceptions now earning as much per job as they did when their nominal hours were forty-four or forty-eight or maybe fifty-six. The Social Security Act will, of course, add to the payrolls.

The sum of all these expected increases will mean the deferment of reductions of rates to customers. Our rates are now so low that ninety-nine out of each one hundred possible customers use our service now for their needs. In the past they have had their share in each and any reduction of cost. If, by legislation, our costs are to be raised, there will be nothing to share and customers will just have to take their medicine. You bankers know that costs and taxes always must reach the ultimate consumer. I wish that every ultimate consumer of ours could have that certainty made clear to him!

To end this set address to you—I am a puzzled manager, but not a fearful one. I continue to believe in the good future of my own district, my own State and these United States. Perhaps unreasonably I believe that the stream of the present depression is nearly crossed, and that on the other side of that stream there will be less puzzling, easier trails, and perhaps some rest for the weary. Amen!

National Accounting Conference Attracts Large Attendance

THE first National Accounting Conference of the Edison Electric Institute, held in Detroit, Mich., Nov. 8-10, was attended by some 350 enthusiastic accounting people and others interested in the accounting problems confronting the industry with respect to the new Uniform System of Accounts and related matters issued by the federal and state regulatory bodies. Many important features were reviewed through the presentation of papers and general floor discussion.

All sections of the United States were represented at this meeting, as well as four representatives from Canada including Mr. R. W. Louthood, Chairman of the Accounting Committee of the Canadian Electrical Association, and one representative from Hamilton, Bermuda.

The registered geographic representation was as follows:

New England States	24
Middle Atlantic States..	101
East North Central States	122
West North Central States	19
Southern States	32
Mountain States	1
Pacific Coast States.....	4
Total United States..	303
Canada	4
Bermuda	1
Grand Total	308

Monday morning was devoted to separate meetings of the four groups which have been formed under the sponsorship of the Accounting Committee for the purpose of making specialized studies. For the most part these meetings were organization meetings followed by a discussion of the subject matter to which the groups might wish to give special attention during the coming year.

The general opinion of those working in the specialized groups appeared to be that formal committee reports as such should be avoided and that the groups should operate for the time being at least on the basis of an interchange of information within the committee. It was also thought that any prepared material which might be made available for general distribution to the industry might be presented in the form of an open discussion or conference such as had been called in this instance.

The joint meetings began promptly at 2.30 Monday afternoon, and following the opening remarks of Mr. Bernard S. Rodey, Chairman of the Accounting Committee, the accounting people had the pleasure of pointed comments and advice from Mr. Alex Dow, President of the Detroit Edison Company, gleaned from his many years of successful experience.

MR. RODEY

The balance of the afternoon was taken up with the discussion of the general aspects of the new federal and state systems of accounts and the annual report forms to commissions; the preservation and destruction of records; and a lively discussion on the subject of sales promotion and merchandising accounting. These matters were ably sponsored by Messrs. C. E. Kohlhepp, F. P. Dexter, E. S. Brock, W. Avery, and C. R. Landrigan. This session was presided over by Mr. C. E. Kohlhepp, past Chairman of the Accounting Committee. The Tuesday morning and afternoon sessions were devoted to open discussions on plant accounting records and related matters. Mr. Rodey presided at the morning session and Mr. H. L. Gruehn at the afternoon session.

The morning session was led off by a splendid paper on original cost determination presented by Mr. J. V. Cleary, Vice-Chairman of the Plant Accounting and Records Committee, followed during the day by prepared papers and discussions on matters relating to retirement units; reconstruction costs; a discussion of transmission and distribution; treatment of construction overheads and indirect costs; and plant inventory problems. These matters were ably presented by the following discussion leaders: Messrs. H. W. Endres, John Dockendorf, J. L. Sunday, E. Hery, J. M. Kramarsik, S. L. Ferguson, J. H. Lobban, and H. W. Alrich. The afternoon session closed with an admirable presentation on depreciation accounting by Mr. M. R. Scharff, Consulting Engineer.

On Tuesday evening Mr. Bernard F. Weadock, Managing Director of the Institute, was toastmaster at an informal dinner attended by 230 persons. In addition to being honored by the presence of Mr. C. W. Kellogg, President of the E.E.I., those in attendance had the privilege of hearing from two gentlemen who stand high in their respective fields in Engineering and Education. These were Mr. J. F. Fairman, Chairman of the Electrical Equipment Committee of the E.E.I., who presented a paper on "Engineering and Accounting Economics," and Dean John T. Madden, head of the School of Commerce, New York University, who delivered a discourse on "Accounting Jurisprudence." Both of these papers are reproduced in this issue of the BULLETIN.

The open discussion on Wednesday morning, presided over by Mr. J. H. Lobban, another past Chairman of the Accounting Committee, was conducted by Messrs. K. E. Boyle, Chairman of the Customers Relations, Commercial Accounting and Collections Committee, and E. S. Brock, Chairman of the Purchasing, Stores and Transportation Committee. This was a very active session, with much discussion and many questions arising with respect to the papers presented on subjects coming within the scope of these two Committees.

The sponsors presenting the various subject matter for discussion were: Messrs. E. N. Keller, W. H. Waterbury, P. F. Gow, E. M. Wagner, J. A. Williams, W. D. Dyer, O. J. Vosbrink, G. McDougall and K. C. Campbell.

Wednesday afternoon the convention listened to a discussion of a most interesting subject, Social Security Accounting, by Mr. H. A. Ehrmann.

The Wednesday afternoon session closed with the presentation of a paper

(*Continued on page* 451)

Accounting Jurisprudence

By John T. Madden

Dean of the School of Commerce, University of New York

An address before the National Accounting Conference, E.E.I., Detroit, Nov. 9, 1937.

IT was with pleasure that I accepted the invitation to address you this evening. Many of you I have known for a long time; others are former students in my classes in accounting who have attained high places in the industry in spite of my poor lectures. It has been my privilege to sit in your councils from time to time for more than two decades, and I have always come away refreshed and intellectually invigorated. I never thought of it before, but I am wondering at the moment what you got out of my presence on those occasions. I am sure that I received more than I gave. As I look back over the years, it is stimulating to recall the progress which has been made in accounting practice, the difficulties encountered and overcome in this period of sharply rising and falling price levels, the improvements in the process of recording and presenting financial facts.

My topic was assigned by your Chairman. As I thought about it, I was led into many interesting by-ways, although I fear that it is a solemn subject for an after-dinner talk and too vast to be dealt with adequately in the time allotted.

Perhaps we may begin by considering first what jurisprudence is and what accounting purports to be. Jurisprudence has been defined as the science of justice, under law. It is described as a philosophy, a science, and an art.

Jurisprudence as a philosophy has as its desire to understand what justice is. Accounting also is a philosophy in its desire to understand the nature and consequences of pecuniary transactions which take place between persons, either natural or artificial. One of the first modern books on accounting written by an American was the "Philosophy of Accounts," by Colonel Charles Ezra Sprague.

As a science, the purpose of jurisprudence is to explain the evolution of justice. There are some who think of justice as something eternal and unchangeable, lofty as Divine Law, but this is not so. Justice shifts its standards as customs shift. Accounting is a science

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but not an exact science like mathematics. In arithmetic, we add two and two and get four, regardless of time, place, and circumstance. But in accounting our units are not always alike or capable of reduction to a changeless value or relationship. Accounting also shifts its standards according to custom just as justice does.

Jurisprudence as an art aims to formulate those rules of conduct essential to the realization of justice. Accounting, on the other hand, attempts to formulate rules of procedure for the recording of property or property rights in terms of a common denominator—money.

Both jurisprudence and accounting play an important part in human activity, and they constitute a background for a great part of that activity. Perhaps an illustration may set this forth more clearly. Justice comes into play only in that part of the conduct of an individual in which others are concerned. It is the right to the greatest amount of human independence compatible with the same liberty for others. To put it another way, it is the principle which reflects the ethical sense of the community, or which dictates that conduct of man to man which may fairly be respected by both in accordance with custom. If there were no differences among men or no conflicting claims or strife, there would be no occasion to call upon justice.

Accounting records the initial investment of the owner, the subsequent additions thereto and deductions therefrom, the receipts of money income and outgo, the changes in the form and nature of assets and liabilities, and the results of operation. If the owner was not curious about his economic progress, he might not require any records or he might make them as simple as the tavern keeper in the olden days, who merely chalked up on a blackboard behind the bar his customers' P's and Q's, that is, the pints and quarts of beverages which he had sold his patrons on credit. But where more than one person is involved, accounting attempts to formulate principles and keep records which will show the interests in the values recorded on the books of those who hold conflicting claims in property. Custom is a cogent and compelling force in this field as it is in law.

I used the term "value" a moment ago. There are, as you know, several kinds of value. For example, there is "value in exchange" and "value in use." We may imagine the meeting between the first white man and the first Indian. The Indian exchanged twelve beaver skins, we will say, for a good sharp knife which the white man possessed. This established the "value in exchange." If it was, as we shall assume, a fair bargain at arm's length, each party was prompted to make the barter or dicker because each had a "value in use" greater than the "value in exchange." Perhaps the Indian thought to himself, "Why does this white man give me this good knife which enables me to hunt more effectively and get the food I require, in exchange for these beaver skins of which I have plenty?" And perhaps the white man was speculating on the good prices he would get for the beaver

skins when he returned to civilization. In the beginning, therefore, and for over 400 years, accounting recorded in the books the amount of the investment of the owner, that is, his cost. It recorded exchanges at the "value in exchange." It did not attempt any further analysis. It certainly did not attempt to record on the books of the white man the cost to the Indian, if that could be obtained, (estimated, if not otherwise ascertainable).

The system of jurisprudence which would answer the needs of a simple economy, say a pastoral or agricultural community, would manifestly not meet the needs of a complex industrial society. Accordingly, a new philosophy of industrial liberty was necessary to meet the requirements of a new industrial order. The economic progress of society with its increasing interdependence of individuals inevitably created conflicts which were wholly absent in the more simple situation. The individualistic organization of business was yielding to the corporate form and while the natural person was generally credited with having a soul, the artificial person was dubbed the "soulless" corporation.

The history of accounting records a similar comparative development. When Paciolo, the Franciscan Monk, wrote his treatise on bookkeeping in 1494, the business transactions of individuals or partners dealt for the most part with separate vessels, cargoes, caravans or ventures. The goods were agricultural or mineral products or simple handicraft goods. The profit or loss on each venture was readily computed. But the multitudinous goods and services of a more complex society demanded different accounting customs and records. In the latter period, the transactions were not readily separable, but consisted of a continuum of processes and the computation of profit and loss necessarily became more of an approximation. The books of record in Imperial Rome were kept largely by slaves who recorded cash income and cash outgo. Our records are kept by highly trained technicians, often with the aid of mechanical appliances and deal with items other than cash.

But there are other differences. The proprietor or partners of these "good old days of long ago" are replaced today in large measure by the proprietorship of many thousands—our common and preferred stockholders. The liability for money borrowed from Shylock, the money lender of Venice, secured by the collateral of a pound of flesh, is replaced by sums due to a multitude of lenders, who may have differing rights of priority which the modern representatives of Portia's profession frequently have difficulty in determining.

Antonio's assets, for the most part, were the current assets of today, and Paciolo was not required to consider the large investments in fixed assets, having a useful life of many years with which the modern accountant is so largely concerned. It is interesting to note in passing that depreciation was mentioned once at least in the literature of the last years of the 16th Century.

To return for a moment to this factor of custom. What we call custom is a most powerful force in society. For example, the laws prohibiting the sale of intoxicating beverages came into conflict with customs of individuals which were so well established that it was found impossible to enforce these laws except in relatively isolated instances. In fact, the force of custom limits the power of the sovereign who attempts to change it. Hence, if we are to have peaceful living, the important thing is to ascertain what the custom is, to endeavor to conform to it, and to reduce the custom to written laws so that all may know what the custom is. From time to time, as our customs change in a dynamic society, we alter our laws or forget them altogether. Moreover, customs are not the same in all nations at the same time, nor in all places within the same nation.

One of my academic colleagues recently pointed out that in 1932 if a man walked down Broadway with a flask of whiskey in one pocket and a five dollar gold piece in another, he was violating the law in transporting the liquor, but would be within the law in the possession of the gold. Scarcely two years later, the same man similarly circumstanced would be within the law in possessing the whiskey, but subject to fine and imprisonment for possessing the gold piece! And yet one can buy gold freely in London.

But what is true about custom in matters of law, is also true about custom in accounting. We put debit entries on the left hand side of a ledger account and credits on the right hand side. This is the result of custom only. Bookkeepers began to keep records in that way and that custom now has the force of universal law. No harm would be done if the process were reversed and if that custom were consistently followed. The exercise of individual idiosyncrasy in this instance would not be a violation of custom sufficiently important to call for legislation. Another illustration in accounting is found in the published balance sheets of British enterprises which show liabilities on the left hand side and assets on the right hand side, even though the bookkeeping process is identical with our own. It has been said that this custom arose from the fact that the companies' act promulgated a pro forma balance sheet of that type, and British accountants merely followed the law. Here we have an illustration of a custom, peculiarly local in character (for in no other nation is the British form current) which is adhered to because the law does not do such violence to tradition or experience as to arouse opposition. It is as easy to conform, as not to conform.

In determining what constitutes good accounting practice in any given case, we attempt to ascertain what the prevailing custom of accountants is. We find a high degree of uniformity in some matters. In other instances, we discover a surprising lack of uniformity. The differences are material in some cases, and immaterial in others. During the last quarter century great progress has been made in establishing a higher degree of uniformity in accounts in many lines of industry. The classifications of accounts hitherto promulgated by regulatory commissions have aided in the development of a better technic in your industry. The incidence of taxation has been a potent force in the improvement.

The lack of uniformity in the practices of accountants has been criticized by some who doubtless feel that there should exist that precision and exactness which characterizes arithmetic. These critics have overlooked the limitations of accounting in its attempts to meet and solve the baffling problems created by the dynamic character of modern business. We have not yet attained perfection in the art of living, although the race has been practicing that art these many centuries. Have we the right to expect more of accounting?

One difficulty was that a long financial history not only resulted in a loss of the ideal relation between asset and liability accounts, but also between the asset accounts and the assets themselves. I need not relate to you your own expe-

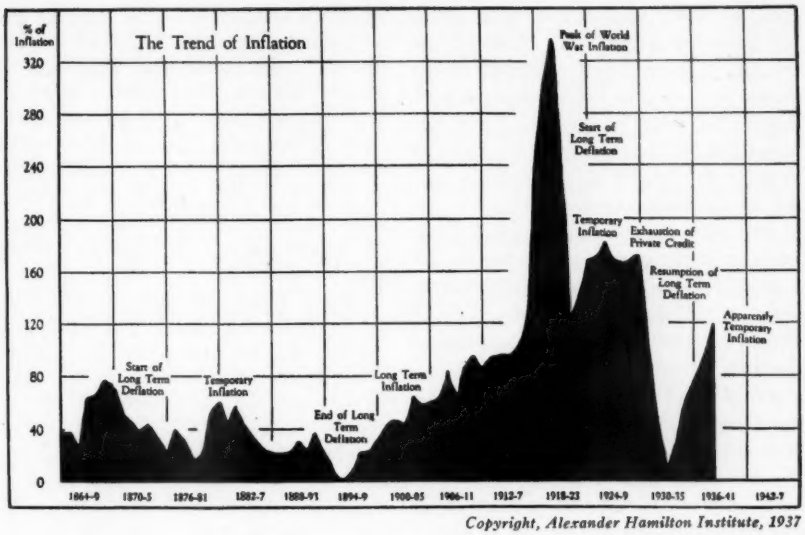
rience in keeping "track" of the identity of property caused by additions, renewals, betterments, replacements, losses, sales and abandonments in a far-flung property of complex character over a long period of time.

But there was another problem. Should accounting reflect the fact of the changing dollar value? Long before conventional accounting recognized the significance of the fact that the "yardstick" or unit of measure did not remain constant, the United States Supreme Court said in Smyth v. Ames (1898) that to ascertain value, "the present as compared with the original cost of construction" is, among other things, a matter for consideration. The fact is that in the years that followed, this distinction became a matter of much greater importance. I shall reserve for a more extended discussion in another forum a detailed consideration of this problem. Suffice it to say here, that the changes in the price level exercised a profound influence on the accounting and reporting during a period of several decades, but particularly since the beginning of the World War. Today, after a collapse of values, greater than any previously known in history, we may readily condemn what we did not have the foresight to avoid. With hindsight, we may apply to transactions of prior years an academic analysis and sapient judgment based on knowledge which all the world now shares but which neither the critics nor anyone else—formerly possessed.

Through the courtesy of the Alexander Hamilton Institute of New York, I have the privilege of distributing to you a chart showing the Trend of Inflation. You will note that the trend was downward from the end of the Civil War, following a definite pattern of development after great wars, and it reached its lowest point in 1895. When the Smyth-Ames Case was decided in 1898, the trend of inflation had resumed its upward movement.

Of course, the Supreme Court did not know there was to be a World War in 1914, but its decision in 1898 was almost uncanny in its prophetic vision. Doubtless there would have been difficulty of arriving at original cost in those days due to the crudities of bookkeeping of the earlier period before the influence of uniform systems of accounts could make itself felt. But it would seem that the Court saw into the future with a sound conception of economic laws.

The economic fact is that if an asset



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ceases to earn profits, its value will almost universally be nil regardless of the fancy or quixotic bookkeeping we may indulge in. Regardless of the amount at which assets are carried on the books of account, the capital, whether prudently invested or not, is worthless if it can never earn a fair return. The accountant may keep his records of capital acquisitions on the basis of cost to the acquiring company, or on the basis of cost to some former owner one or more steps removed, but the economic fact still remains that the real capital of an enterprise is measured in the terms of its earning power and not on the basis of what the assets may have cost or at what amount their value may appear on books. This simple elemental fact was recognized by the Supreme Court long before the price gyrations of the past 35 years began to register their influence, and one state commission after another, by a long line of decisions and opinions have given clear evidence of their recognition of this economic truth.

It is a well known fact that this industry is not attracting the capital needed at the present time. This is not because the asset values may have been written up, nor because the industry may have been guilty of alleged accounting abuses, nor because, here or there, a spectacular receivership may have occurred. The present and prospective investor as well as the consumer may not be interested in a particular method of bookkeeping about which accountants of the industry and the accountants of bureaucracy may differ. But they are interested in knowing whether profits are being earned, and whether the capital already invested and to be invested will continue to go on earning profits and whether the rate of return is reasonable. As a matter of fact, the balance sheet of an enterprise is for this purpose almost a negligible quantity. There are indeed no balance sheet accounts for one of the most important factors of earning power—namely, the skill and ability of the management.

I cannot take the time on this occasion to refer in detail to the existing evidence over many years that our state regulatory commissions have had a very clear idea of the nature of economic capital as distinguished from the mere accounting record of capital. Suffice it to say that, time and time again, they indicated that they were not misled by bookkeeping conventions or accounting limitations in their decisions and opinions. For the most part, their decisions and opinions show a clear understanding of the nature of business capital. It is, therefore, all the more difficult for me to account for the action of the National Association of Railroad and Utility Commissioners in yielding to the recent aberration or this new connotation of "original" cost. The economic fact is that whether assets are newly acquired by original construction or transferred from one owner to another, the economic value is invariably determined in terms of anticipated earning power.

The accountant was, therefore, confronted with several irreconcilable ends. Objectively, he knew that assets should be recorded at cost of acquisition. This was convenient in practice as well because the record was supported by a voucher or bill of sale. He recognized

too that fixed capital was used up in the earning of profits. He developed the process of holding back a portion of the profits in a reserve for retirements or a reserve for depreciation with the expectation that when the last unit of service was rendered there would be other capital to replace that consumed.

He also differentiated capital from revenue in the accounts of a corporation because he was under the obligation to see that withdrawals of profits did not encroach upon the capital fund—capital must be preserved intact.

He also clearly recognized that his accounting process of cost less depreciation did not fit the facts, however simple and convenient it might be in practice, because if the capital was incapable of earning profits there was no true capital—no matter how intact it might appear in the accounts.

No wiser decision in a matter involving economics was ever made, and no legal principle more sound from the economic point of view was ever established in a court of law than the decision in Smyth v. Ames. The Supreme Court wisely adopted a basis which does permit the recognition of all relevant factors in considering questions involving fair value and rates of return. And as experience has shown, it is a wise legal principle which provides that the base on which rates are to be determined is the value at the time of the inquiry of the property used and useful in the public service, such value not to be determined on an arbitrary formula, but a reasonable judgment based on adequate consideration of all evidence.

Of course, it must be granted that the process of determining fair value has been costly and time consuming in many instances, and the impatience with the delay and the criticism of the cost have been reflected in proposals looking toward some new alchemy or process by which these objections might be overcome. Cumbersome as the rule of the Court may appear to the layman or to the critics, the violent fluctuations both in price levels and in the value of the dollar have precluded the adoption of more simple processes if economic justice was to be done.

The accountant, therefore, found difficulty in doing sums in addition and subtraction in his books, because one and one only made two in those instances where the units were alike. I venture the assertion that the greatest portion of our difficulties in record keeping and in making financial statements during the past two decades has been created by the fact that our yardstick has been a fluctuating unit of measurement. A very substantial portion of the so-called abuses in accounting have arisen either directly or indirectly out of the efforts of accountants to adjust their practices, procedures and reports to the fluctuating price level.

Many unjust laws have been enacted in the course of human events but justice sits in judgment even on the law. More injustice has been inflicted in the name of law and by the enactments of law makers than ever was inflicted by the unwritten laws that spring from the customs of men in society. Most men are fundamentally honest. Most men will live up to the letter and spirit of the bond they give. Our government, however, after covenanting to pay its obligations in gold welched on its contract. The conscience of the sovereign in this instance stands in unfavorable light when contrasted with the conscience of its citizens. Many unjust laws have been passed in the heat of passion, or without an intelligent preliminary study of the facts—yes, even upon the basis of false, misleading and biased information conveyed to legislators.

It should be the object of good government and good law to allow the individual the largest amount of freedom of individual action. From the very nature of things, the conditions in small or rural communities might require far less legislative interference than would be necessary under the more complex social conditions. We have only to think of the many ways in which individuals come together or have relationships in large cities that are not customary in the smaller communities. In a similar manner, the accounting system or technic suitable for a large, far-flung business organization should not be imposed upon a smaller organization. In our attempts at uniformity in accounting, there is the inclination to overlook this factor. Unfortunately there is also a tendency today to so multiply accounting regulations that the accountant is required to be like the man referred to in "Hudibras" by Pope,

"Who would with logic absolute
The two and seventy jarring sects confute
And hairs split, twixt north and north-west sides."

It is a sound maxim that that nation is best governed which is least governed. It is certainly true that unnecessary complexity in accounting regulations imposed alike upon all enterprises wherever located throughout the length and breadth of this nation is a social evil, greatly to be deplored and demanding correction. It is, of course, a difficult thing to draw the line at the exact point where compulsory requirements shall cease and individual freedom shall begin. The tendency always is to abridge freedom through the over-rated idea of the virtue of uniformity. Just as there is no form of government which is best suited to all societies so also there is no detailed accounting classification with its attendant regulations which is best suited to all enterprises in a given industry.

A system of government unnecessarily complex means unnecessary cost to the citizen who will be burdened with taxes to pay for salaries and expenses. There are many instances where the cost of government has been raised out of all proportion to the benefits which the citizens receive. A system of accounts in a regulated industry which imposes upon consumers unnecessary and economically wasteful costs is wholly unjust and lowers the standard of living and the happiness of citizens.

Before taking up my final point I will refer to a discussion in that richly philosophic work entitled "Alice in Wonderland" which I quote:

"'Can you do addition?' the White Queen asked. 'What's one and one and one and one and one and one and one and one and one and one?'

'I don't know,' said Alice in Wonderland. 'I lost count.'

'She can't do addition,' the Red Queen interrupted.

'Can you do subtraction? Take nine from eight.'

'Nine from eight, I can't, you know,' Alice replied very readily. 'But——'

'She can't do subtraction,' said the White Queen. 'Can you do division? Divide a loaf by a knife—what's the answer to that?'

'I suppose——' Alice was beginning, but the Red Queen answered for her. "Bread and butter, of course. Try another subtraction sum. Take a bone from a dog; what remains?'

Alice considered. 'The bone wouldn't remain, of course, if I took it—and the dog wouldn't remain; it would come to bite me—I'm sure I shouldn't remain!'

'Then you think nothing would remain?' said the Red Queen.

'I think that's the answer.'

'Wrong, as usual,' said the Red Queen. 'The dog's temper would remain.'"

Among the reasons advanced for recent legislation affecting your industry was the charge that the industry had been guilty of accounting abuses. This charge was based upon the results of an

investigation and I have dealt with some phases of that investigation upon another occasion. But while the investigation was going on, agitation for a new method of record keeping made its appearance. The proponents of the theory of what we know as "aboriginal" cost were as active as the zealots of a new political philosophy and they have finally accomplished part of their objectives.

It now appears that where a utility is subject to the jurisdiction of a regulatory body which requires the new theory of "aboriginal" cost in fixed capital accounting, it is held not to be an unreasonable requirement to compel a company to recast its accounts at great expense and without significant advantage to consumers, investors or regulatory authority solely to conform to a theory promulgated by a small group of advocates. This theory is contrary to all weight of accounting authority and practice both here and abroad.

This is not the first foolish law or regulation that has been passed nor will it be the last. Martin Luther once said that humanity was like a drunken peasant on his horse lurching from one side of the road to the other. Our poor human race fails to learn as much as it should from its past and old errors are revived and new errors make their appearance. And so we often take a long road or a wrong road to reach our destination.

Economic fallacies, as old as the race itself, like old soldiers, never die. They are hardy organisms which appear, flourish, and later fade away, never completely lifeless, only later to reappear with all their pristine strength. But, in addition, new fallacies appear from time to time and they, too, flourish and in due course disappear.

The systems of accounts recently promulgated by some Federal and State regulatory agencies dealing with Fixed Capital Accounting are examples of accounting regulation run riot, the acme of accounting asinity. If only there would arise some benevolent beadle to beat the bats from bureaucratic belfries! In England, which is still blessed with intelligent civil servants and which is as yet uncursed with the new philosophers of accounting which flourish here, this new method of account keeping has been most aptly dubbed "Midsummer's Madness."

Someone must foot the bill for the cost of recasting the accounts and, as usual, it will be the ultimate consumer. He has no ready protection from the cost of such noble experiments on a national scale which the courts are forced to rule are not an unreasonable exercise of power under the laws which have been enacted. The only remedy rests with legislative assemblies or with those commissions which, when the matter is brought to their attention, will possess the wisdom necessary to prevent an accounting abuse greater, more costly, and more serious than any accounting abuse ever charged against the industry.

As for you who are charged with the job of recasting the accounts, all I have to say is that accountants are tough and seem to survive all catastrophes. The folly of the thing may seem intolerable, and it will certainly be as irritating as any of the hair shirts you have been compelled to put on from time to time, if not for the good of your soul at least as a test of your resourcefulness. We have pleaded the cause of investor and consumer, both you and I, in different forums and our professional consciences may rest easily on that account. I have read the record, and your valiant endeavors to avoid economic waste seem, in part, to have produced nothing. When the task of rewriting the accounts is completed, I shall not be astonished to learn that values have been discovered which were lost sight of in the vicissitudes of multifarious changes in a complex property having a long history. Even with the best of intentions and the most scrupulous care, the cost of property has not always been recorded with the fidelity we would have wished and which we tried to attain.

Despite the criticism of your work and the parade of alleged abuses, your profession has attained a state of eminent respectability. Your detractors have done their work well and their temporary success is due to the fact that the art of finding the truth is little practiced in modern political life.

Experience teaches us to look for hidden motives in legislation. Can it be that the purpose of the new regulations is not a "reform" in accounting itself —for the cost in some cases puts a burden on the consumer wholly unwarranted—but rather to accomplish by indirection something that cannot be accomplished directly? Is the motive that of taking control of management through an accounting device? Is it the intention to change the rules of the game and to attempt the establishment of a new and exclusive basis for determining rates of return different from the method which has long been the law of the land and upon which investors have relied?

If these are the motives, then it behooves our commissions, both Federal and State, to consider before taking action or to reconsider if action has already been taken. And if the argument on the basis of reason shall not prevail, may I offer another which may arrest attention? It is this. The long-term deflation which started in 1919-20 has not been completed, in my judgment. The inflation since 1932 which appears on the chart in your hands as "apparently temporary inflation" is probably accurately described.

If there are those who intend by the new methods to scuttle the long-established principle of a reasonable return on a fair value and to substitute "aboriginal cost," they may find themselves sadly mistaken when a few more years have passed into time.

The formula of Smyth v. Ames affords as much protection to the consumer as it does to the investor. Our public authorities, conscious of their responsibility in the interest of the consumer, ought to proceed with great caution before committing themselves to the valuation implications of "aboriginal cost" accounting.

National Accounting Conference

(*Continued from page* 446)

on the important subject of cost allocations in combination companies, by Messrs. H. C. Davidson and P. R. Williams.

The First National Accounting Conference came to a close with a few closing remarks by the Chairman, Mr. B. S. Rodey, who expressed his appreciation for the enthusiastic attendance at the conference. In addition to resolutions relating to the committee activities for the coming year the following resolution was offered from the floor of the convention:

"RESOLVED: That Mr. B. S. Rodey express appreciation to Mr. Dow and his associates for their splendid cooperation in arranging for the sponsored tours in Detroit and the special attention given to conferees who have visited the various departments of their company."

Engineering and Accounting Economics

By J. F. Fairman

Consolidated Edison Company of New York, Inc.

An address before the National Accounting Conference, E.E.I., Detroit, November 9, 1937.

THE change of one letter in the last word of the title of my subject would probably more accurately reflect the general tenor of my remarks. If we change the last "c" to an "e", the word "economics" becomes "economies", so with your permission I am going to discuss engineering and accounting economies.

This change was suggested by a recent experience. There appeared on my desk a sixteen page report prepared by one of the engineers in my department, which begins as follows:

"In making economic studies of alternative plans of design and layout, the percentages used for the computation of annual costs have not always been uniform and sometimes figures have been used which are incompatible with present-day policy or past experience. It was with the thought of correcting this condition that a study was made of available data as they affect carrying charges on the investment of outside plant."

No one can disagree with that preamble. Obviously, if the engineer is intelligently to weigh alternative plans of development, he must take into account annual carrying charges which reflect, as accurately as possible, actualities; otherwise, he may be led to erroneous conclusions.

The second paragraph of this report contains a word which caused me to pause and ask questions. I quote again:

"The results of the study indicate that a differentiation should be made between standard and non-standard systems, so far as the item of depreciation is concerned."

Perhaps I should explain that the terms "standard" and "non-standard" as applied to our distribution systems are used to distinguish between the alternating current network system and all other systems. We have been extending and reenforcing the standard system and gradually curtailing the non-standard systems.

I have no quarrel with this statement; I believe it to be true, but I began to be curious as to the bases of the differentiation on the item of depreciation. Also, I began to wonder what authority we had for the percentage selected for return on investment and the percentage to be applied to fixed capital to cover operation and maintenance of plant. As I read further, it became apparent that the engineers who prepared the report must have had some extended conversations with our accounting friends and that they had applied the best judgment they were able to obtain to the all too meagre information obtained from the accountants. I think we can agree that there is nothing wrong with this process or the motives back of it, but time and again I have seen such innocent and wholly laudable efforts lead to the setting up of a group in the engineering department for the purpose of delving more and more extensively into accounting problems in order to obtain information which the engineers need in their work.

We have just been through a rather extensive reorganization in which some of these extra-curricular activities of engineering, construction and operating departments were lopped off and restored to the departments where they belonged. These transfers were made for the purpose of avoiding duplication of work and effecting economies. I am, therefore, desirous of heading off another one of these unnatural growths and I called the authors of the report in to discuss the matter with them. They were, of course, innocent of any intention of setting up a new semi-accounting group in the engineering department, but they were very vigorous in their expression, with which I had to concur, that we needed this information in order properly to do our job and for the moment, at least, the only way to get it was for us to go after it.

This brings me to one of the things I want to talk about: If such unnatural growths in an engineering organization are to be prevented, two things must happen; first, the engineers must be able to state clearly to the accountants what it is they need, why they need it, and how they propose to use it; and second, the accounting department must be in a position to provide the information in a way it can rightly be understood and rightly used by the engineers. We are taking steps to bring about this mutually desirable result and I believe I can safely say that it is much easier for us to approach this as a problem of mutual concern as a result of our renewed acquaintance during the past few years brought about by our engineers having been drawn in on the problem of continuing property records.

This leads me to the next thought: If we are wise enough to adapt these new accounting requirements imposed by the various State and Federal regulatory bodies to our other normal processes in a way to get a maximum return, we may be able to effect surprising economies in those operations. If the only result were to be a better understanding by engineers and accountants of each other's problems and a better understanding of the fact that those problems are not their exclusive affairs, much lasting benefit to the companies will have been effected.

We may as well frankly face the fact that human nature, being what it is, the things that I am working on become my exclusive affairs and the things that you are working on become yours. All too frequently this leads to the erection of departmental walls, which, in the course of time, become thicker and higher and eventually herculean efforts are required either to scale them or break through them. If I am too busy to give you help on a problem when you ask for it, you will seek the solution yourself independently of me, and you will gradually accumulate some engineers on your payroll. The converse is equally true.

I believe these new Commission requirements give us the opportunity we have been needing to become better acquainted and to work together for the welfare, not of our particular departments of the business, but for the business as a whole.

I am entirely conscious of the very natural effort frequently made to reduce the operating expenses of a department by lopping off things which don't seem to be of very great importance to that department. It is a fine thing to discontinue operations which no longer serve a useful purpose, but it is quite another thing, if in so doing, we transfer the operation to another group who cannot handle it as economically. Worse than that, it may bring about a duplication of effort in the company which is far more costly.

It seems to me that these new requirements will, in the course of time, make available a great deal of information based on fact and experience which has hitherto, of necessity, been estimated by the engineers. My plea is that you take advantage of this opportunity to make available to the engineers such factual information. Obviously, engineering studies and reports cannot continue to be made on assumptions or estimates which differ from facts disclosed by up-to-date accounting practices, and you should make the engineers aware of the availability of this information.

During the past few years, and even today, the principal job that the engineers of the industry have had is to make a little go a long ways in respect to the physical property. One of our principal handicaps in doing the job which we were assigned was to obtain factual information about costs in terms that we could apply intelligently to the physical property. It seems to me that these new accounting requirements can be made to yield extremely valuable information at a very low increment accounting expense if you realize this in setting up your processes.

Again let me emphasize that I am not suggesting that the accounting departments should incur additional expenses for the sake of reducing engineering expense. I am simply suggesting that the company, as a whole, will save if we jointly make a proper approach to this problem.

In our business we have daily and seasonal variations in load. I understand that in accounting departments there is a somewhat analogous load cycle of work. Your books have to be balanced at intervals, statements have to be prepared as promptly as possible after the end of a month or a year, and for a few days your departments are extremely busy. I don't mean to infer that you don't have anything to do the rest of the time, but I do suggest that you consider using the somewhat less busy periods to look over some of your statements and tabulations and balance sheets with an eye to what items might be of interest to some other department in the company, if they only knew about them. I am not suggesting that you should try to determine what should be done about a particularly large item of expense, but I am suggesting that you might, for example, point out any unusual fluctuations in the expenses in connection with generation, distribution or commercial activities, to the responsible department heads, so that they may have a chance to think about it and perhaps do something about it before, as occasionally happens, the situation becomes serious enough to gain the attention of the executive. In other words, I believe the interest of the company is best served by letting every man put on his own pressure and I believe most of us will do that if the necessary facts are brought to our attention.

I know that those of us in the engineering end of the business so frequently become intensely interested in certain technical problems that we are apt to lose sight, temporarily, of certain more important problems which ultimately affect the balance sheet in a way we would like to have avoided. We need shaking out of our respective grooves and I believe the accountants could perform an extremely valuable service in doing this in an informal and friendly manner. Of course, I am not suggesting that if you find us disinterested or obdurate that you should not report these matters to the executive in order that he may call us up on the carpet, but I am suggesting that you give us the chance to work with you to save the executive from some of the problems which you and we together could solve.

The second matter I wish to discuss has to do more specifically with the prob-

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Dinner Meeting of National Accounting Conference at Detroit, November 9

A Technique To Meet New Commission Requirements

By George M. Vesselago
Engineer, Day & Zimmermann, Inc.

Presented before the joint meeting of Electrical Equipment and Transmission and Distribution Committees of the Edison Electric Institute. Cleveland, Ohio, Tuesday Morning, Oct. 12, 1937.

THE several new Federal and State laws, regulations and Uniform Systems of Accounts provide for more rigid and comprehensive "Cost-of-Service" information both as to plant and as to operation.

The problems arising from this most recent aspect of regulation are many and complex, but they are susceptible of practical solutions which cannot, however, be achieved overnight by a magic formula. The following discussion enumerates certain of the major problems and suggests an approach to their solution, which is believed to be adequate, economical and practical.

In meeting the conditions created by the new requirements, an appropriate technique can be developed which will not only provide the desired cost data but also a current inventory or schedule of items of physical property in sufficient detail for all practical purposes.

The laborious proceedings necessary to develop and fix the fair value of and fair rate of return on public utility properties have caused much criticism from a regulatory standpoint and the present tendency is to make temporary determinations on the basis of current records and related construction and operating costs. It is therefore important that current records present as complete and accurate data with respect to plant and related costs as may be had within the limits of practicability.

Summary of Principal New Regulatory Requirements

The three requirements of several recently promulgated Systems of Accounts under discussion herein are first, restatement of plant accounts on the basis of the so-called "Original Cost"; second, Work Order Procedure as a means for carrying forward the "Original Cost" record on the basis of a rigid rule for distinguishing between maintenance and capital expenditures; and, third, current maintenance of records of plant items and of their related construction costs. A fourth important requirement, namely, depreciation accounting, is merely referred to, in this paper, in connection with plant records for the reason that volumes have been written on the subject by engineers and accountants, as well as statisticians and economists, and much literature is available in support of a number of divergent views.

Several recently enacted state utility laws empower the regulatory commissions to provide specifically for a so-called "Continuing Property Record," and in one state the commission is empowered to prescribe "Cost Finding Procedures." Several states have likewise provided for "Temporary Rate" proceedings by means of which the commission can prescribe rates pending valuation of property at a later date. In most instances the temporary rates are to be based on a return greater than a specified minimum on the basis of "Original Cost" as shown by the plant account less accrued depreciation or less depreciation reserve.

One commission has incorporated into its Uniform Classification of Accounts for Electric Utilities a list of "Units To Be Carried in Continuing Property Record," namely, the Public Service Commission of New Hampshire. The Federal Uniform System of Accounts does not provide specifically for a "Continuing Property Record," but it is evident that to comply with its principal provisions, a record of plant and related costs is essential. In fact, Federal Power Commission's annual report requirements indicate the minimum of detail necessary in this connection, and the resulting record of plant and related construction and operating costs would doubtless provide a basis for comparison of investment and operating results by means of unit costs. The requirements of property or franchise tax authorities likewise indicate the desirability of a record of property and related construction costs summarized by locations in civil divisions and such requirements have been provided for, at least partially, in the new Systems of Accounts.

The Federal Power Commission has also issued recently a list of "Units of Property" for use in distinguishing between maintenance and fixed capital charges in connection with plant replacements, these "Units" being of much smaller size than the broad classifications required in the annual report. The New Hampshire Uniform Classification of Accounts likewise draws a sharp distinction between "Units" to be associated with their related construction costs in the "Continuing Property Record," on the one hand, and replacement "Units" to be used as a guide in distinguishing between maintenance and plant account charges on the other. The now superseded Uniform System of Accounts of the State of New York, which was to have been effective as of January 1, 1934, had provided for a similar distinction.

Whatever the reasoning of the authors of the two sets of definitions of "Units," they appear to represent two distinct yet not contradictory concepts. Interpreted in engineering terms, the New Hampshire list of "Units To Be Carried in Continuing Property Record" approaches the concept of "operating assemblies" and the Federal Power Commission list of "Replacement Units" approaches the conecept of "construction assemblies."

The cost accounting concept is reflected in the new Systems of Accounts in yet another respect, namely, in abolishing the so-called indirect or overhead accounts and providing for the apportionment of all construction costs to the plant elements or accounts. This provision involves the important and complex problems of selection of "Indirect" expenses chargeable to plant construction, and of development of a formula for apportionment of these expenses to the

various construction and operating accounts.

In the development of unit costs engineering judgment must be exercised in the light of the circumstances surrounding supervision, design and the physical work of construction. No accounting certification alone can suffice in these matters and the engineer must assume his share of responsibility not only for establishing the physical facts but also in reaching judgment as to their relative weight and, inescapably, the reasonableness of resulting unit costs.

Original Cost

Identification of Plant Items and Related Costs

Determination of original cost of the plant in existence at a prescribed date involves identification of the elements of plant and related costs. It is apparent that no field inventory can disclose the dates of installation except in certain cases of equipment. In most instances accounting records contain identification of plant items and the related charges and credits only in respect to major plant items, such as land, original buildings, their major alterations, principal apparatus and sections of major overhead and underground transmission lines. Engineering records such as layout plans, construction drawings, line diagrams, transmission and distribution maps, and apparatus and pole inspection cards or lists, together with purchasing records and specifications would provide a clue to the dates of installation and to Work Orders or authorizations, likewise only for the principal plant items.

Very few companies have preserved detail accounting records more than ten or fifteen years and engineering records in most instances do not go back much further. Identification of retirement write-offs with the plant items removed or abandoned is seldom possible prior to 1921 or 1922 when the first accounting systems were issued by a majority of State Commissions.

Construction Costs Charged to Operations

In effect the Federal Uniform System of Accounts forbids reinstatement, in the reclassified Plant Account on "Original Cost" basis, of charges for construction previously made to operating expenses. It is important to realize, therefore, that "Original Cost" determination in accordance with the new Federal Power Commission Uniform System will not represent, in the majority of companies, the complete original cost which is considered in valuation proceedings. In most cases the difference between the two is substantial and arises from a conflict between the essentially accounting concept of "Original Cost" embodied in the System which excludes all elements charged to operating expense, and the essentially engineering concept underlying estimates of original cost prepared for valuation purposes in rate proceedings which include all elements of cost regardless of accounting methods.

One of the strongest arguments advanced in favor of having the plant account set up on "Original Cost" basis as prescribed by the Federal Commission is the resulting uniformity between companies. However, this uniformity would obviously not exist if costs now determined were to reflect variable accounting practices of the past. It appears essential, therefore, that in determining the "Original Cost" in accordance with the Federal Power Commission requirements there should be likewise determined such amounts as were originally charged to operations instead of to fixed capital, substantially as provided for by the new System for all future plant construction work. The additional plant cost thus determined should be part of the Original Cost Record, earmarked for identification, if Federal Power Commission formally disallows inclusion of these costs in the new Plant Account.

Cost Estimates Unavoidable

In most instances the operating companies will not be able to comply with the "Original Cost" requirements exclusively by means of an audit from accounting records, and estimates will be necessary for a substantial portion of the existing plant, as provided for in the Electric Plant Accounts "Instructions of the Federal Uniform System." Moreover, in all instances estimates will be unavoidable in connection with the apportionment of "Indirect" costs to the new Plant Accounts. The estimates must be based on the utility's experience, and, therefore, the burden of preparing such estimates will have to be borne primarily by the engineering organization of each utility, in order to obtain the best results.

The new record of original cost determined by a combined audit and estimate must of necessity take the form of a list of plant items or construction classifications with which recorded or estimated construction costs will be identified. Unless accounting and engineering personnel have a thorough knowledge of limitations of the available records, a great deal of lost motion will result, especially in attempting refinements not justified by the details available in the records from which basic information must be obtained.

Work Order Procedure

The concept of the work order procedure most commonly held by the utility personnel has arisen from budgeting practice and the technique was predicated upon the function of budgetary control which was to provide against spending more than was authorized. Accordingly, the accounting record of construction disclosed all the information necessary from a budgetary viewpoint, and did not provide adequate information as to individual plant items or "units" installed and their related costs. Certain large utilities, however, have provided in recent years for an additional statistical record of plant items installed and retired, likewise based on accounting data of material issued from storerooms, supplemented in certain instances by field inventories of the appraisal type. This additional information was intended primarily as an aid in preparing retirement estimates and as a basis for statistics required by the old annual reports to the commissions.

The foregoing information usually was not meant to serve any purpose in connection with the physical operation of the plant, such as providing cost data in practical form for construction estimates, which should be a cardinal function of work order procedure required to maintain a continuing record of original cost of the plant.

This desired function broadens the scope of work order procedure to embrace both the engineering and accounting records created in connection with construction and retirement, and requires a new technique designed to fulfill the new function economically and adequately on the basis of all the routines involved.

Typical Work Order Routines

Before authorization is granted to proceed with the work, someone in the engineering organization conceives the design and, in most cases, prepares an estimate; one or more sketches and, in

the case of larger jobs, more or less elaborate drawings constitute the record of the design, accompanied by a more or less elaborate bill of material. Similarly a record of the estimate is made, based on the design. To the extent that the design and estimate reflect all the circumstances which will surround construction, this preliminary record may constitute a close approximation of the final record, both accounting and engineering. As the work progresses, a record of requisitioned material, and man-hours and transportation-hours spent is usually prepared.

Thus, from the inception of the work and during its progress, two parallel records are created. The first is the engineering record which usually is, and in every instance should be, revised to reflect work as actually done; and the other is the accounting record which reflects the charges for material, labor and service reported as expended in creating the plant shown by the revised engineering record. The accounting record thus shows the cost based on the "input" and the engineering record shows the resulting plant or "output."

Coordination of Engineering and Accounting Work Order Records

The engineering record of plant items installed of necessity differs from the accounting record of material used in the installation, the accounting record generally showing larger quantities than the engineering record. The decision as to whether or not the difference is legitimate or is due to errors in either or both records, requires intimate familiarity with the circumstances surrounding the physical operations and the exercise of engineering judgment based on experience.

Reconciliation of accounting and engineering records involves, in most cases, substantial differences by reason of unrecorded or improperly recorded re-use of material removed, and use of excess material. Discrepancies are also frequently due to unavoidable confusion resulting from rush and inclement weather in emergency work. The sooner the accounting record of "input" is compared with the engineering record of "output," during the progress or after the completion of the job, the easier it is to reconcile at least major discrepancies and provide for consistency in recording. Similarly the more standardized are the construction methods, including drawings, bills of material, as well as requisitions and other forms on which both the engineering and accounting records are created, the easier it is to prevent large discrepancies from occurring. A nearly perfect record from the standpoint of coordination usually results when work is done by a contractor whose bids and bills are presented to the Company on the basis of "assemblies" installed, as shown on the final drawing, at specified unit costs.

Importance of Local Circumstances

Coordination of engineering and accounting records of construction can be effected only on the basis of a thorough understanding of the functions, responsibilities and characteristics of the personnel involved, and of the existing degree of uniformity in construction methods. In this connection one should not trust Operating Manuals too much. All too often the foreman is expected to do a great deal of accounting work for which he is not qualified, instead of being required to record the results of his work in the straightforward non-accounting language of the layout and other construction drawings. This particular requirement and other similar requirements lead in all too many cases to the creation of fictitious records, which on the surface appear to be almost perfect but under an even casual test turn out to be at variance with the physical facts.

In revising the work order procedure to provide for a more consistent and adequate record of work done, a human problem is involved, for the reason that the personnel concerned with the changes must be convinced that the necessity for doing some of the work in a different way is needful and reasonable. The required changes will not endure, even if accepted in the first place, unless everyone involved in the matter is convinced that they are practical.

Mutual Control of Engineering and Accounting Work Order Records

Nothing short of provisions for effective continuous control of engineering records by accounting records and vice versa can bring about the desired consistency. This control is possible only when the procedure is greatly simplified as a result of all-around standardization, followed by adjustment of accounting work to the hard-boiled physical facts whose mastery is the engineer's job.

Plant Record

The concept of a plant record most commonly held by utility personnel has arisen from appraisal practice. The appraisal inventory technique was predicated upon the function of the appraisal, which was to show the property as of a certain date. Moreover, appraisals were usually prepared to meet an immediate emergency and subsequent current maintenance of the information was not of decisive importance, if at all contemplated.

Consequently appraisal inventories were usually prepared by outside specialists, whose technique was primarily directed towards the speed of compilation. Appraisals were usually not meant to serve any purpose in connection with the physical operation of the plant.

The function of the plant record necessary to comply with the new regulatory requirements, which are based on cost finding rather than valuation concept of regulation, is to make available at all times information that would "facilitate prompt action by the Commission in proceedings involving the reasonableness of the rates." The appraisal inventory technique obviously is inadequate for this new function of the record, primarily for the reason that it fails to meet the problems involved in currently maintaining, by the company's own personnel, records that would yield useful plant and cost data.

The new technique must provide for cost information in terms of units to be used for estimating, therefore cost control, purposes; for economy of current maintenance of the data; and for methods for control of a practical degree of accuracy, which is possible only on the basis of simplicity.

The broader concept of plant record should be based on its new function and on a technique designed to meet the foregoing conditions, and to meet them it should embrace the engineering as well as accounting records.

Engineering Records Used for Operating Purposes

Engineering records maintained for use in connection with the physical operation of electric utility plant naturally vary from company to company both as to scope and details. The following brief review may, however, help visualize the usual practice of the best engineered companies with respect to plant records which are believed to provide the soundest basis for a joint engineering

and accounting record of plant items and related costs:

Graphic Records

(1) "Area Served" map showing divisional or district as well as municipal boundaries, locations of all generating stations, substations and routes of high tension transmission lines.

(2) "Land Plats" showing the boundaries and areas of land owned.

(3) "Right-of-way" maps usually for transmission lines only, showing boundaries, ownership and location of steel towers and poles.

(4) "Floor Plans," "Elevations" and "Sections" of all buildings, usually showing sufficient structural details to provide for an approximate estimate of quantities of construction materials.

(5) "Equipment Arrangement" drawings showing to scale the position of all principal mechanical and electrical apparatus in each generating station and substation as well as the major apparatus foundations, switchboard panels and switching or bus structures.

(6) "Single Line" or "Electrical Connection" diagrams for each station and substation, showing by symbols and brief descriptions all electrical apparatus, principal instruments, relays and, diagrammatically, buses and connections.

(7) "Transmission Circuit" maps showing routes of all the transmission lines, distinguishing between aerial and underground portions, and usually giving over-all distances, and the number, size and type of conductors in each circuit.

(8) "Primary Circuit" maps showing routes of primary circuits, number, size and type of conductors, location and capacity of distribution transformers, switches and other principal devices.

(9) "Secondary Circuit" maps showing routes of secondary circuits, number, size and type of conductors as well as location of the distribution transformer bank feeding the circuit, and major line devices. Services are either shown on the map or listed by addresses, frequently also giving connected loads.

(10) "Street Lighting Circuit" maps showing routes, number, type and size of conductors and location, type and capacity of fixtures as well as street lighting transformers feeding the circuits, and major devices.

(11) "Underground Conduit" maps showing the location of manholes and conduit runs with number and type of ducts indicated.

(12) "Pole Location" maps showing the location of all poles and the number designating each.

Written Records

(13) "Station Apparatus" cards or lists for all the major equipment in stations and substations, usually identifying each apparatus by its serial number, stating its principal specifications and providing reference to Purchase Order number and date, and Work Order numbers and dates of installation in the various locations. These cards or lists usually provide for such entries as transformer taps, relay setting, etc., and a record of breakdowns, repairs and major alterations, frequently with references to the respective Work Orders.

(14) "Cable Length" tabulations giving the length of the cable runs from manhole to manhole, number and size of conductors, and voltage rating, also providing for entries referring to Work Orders and dates of installation.

(15) "Distribution Transformer" cards identifying and describing each transformer with much the same information as stated in "Station Apparatus" cards.

(16) "Street Light Equipment" cards likewise providing for information similar to the foregoing.

(17) "Customer Meter" cards substantially similar to "Station Apparatus" cards.

(18) "Street Opening Record" giving the location and dimensions of the openings; type of pavement and reference to work orders and contracts under which replacement was made.

(19) "Pole Inspection" or test cards stating the size, class, kind and date of installation of each pole, identified by its company number and location, providing for a record of inspection or tests and for a reference to work order under which the pole was installed as well as to joint ownership and permit agreements.

(20) "General Equipment" cards or lists identifying and describing principal items of general equipment such as cranes, machine tools, major testing apparatus, etc.

Characteristics of Graphic and Written Engineering Records from Plant Record Standpoint

A large majority of the engineering plant records are necessarily accurate since they serve such purposes as locating failures in underground conductors, selection of equipment for replacement in emergencies, work dispatching, load studies and design of changes. Moreover, errors involving measurement of length, such as length of conductors, due to the omission or incorrect routing of a line or circuit rarely occur on graphic records, such as "Transmission Circuit" maps, for the reason that such errors are strikingly apparent in graphic representations upon inspection by engineers using the record. On the other hand, errors of omission or duplication in written records such as the several types of cards and lists, resulting from the absence or misplacement of a card or an entry, are not generally apparent without close scrutiny, even to the personnel using the record. Written records, however, generally provide more detail necessary for identification and description of the plant items than do the graphic records.

Furthermore, the written records are more convenient for showing references to work orders under which the plant item was installed in its present location, and this permits their use as a cross-index to work order files from which original cost of construction may be readily determined if required for retirement estimate purposes. Graphic and written records thus complement each other.

Utilization of Engineering Records for Plant Record Purposes

Take-offs and summaries of plant items shown in the foregoing engineering records used for operating purposes constitute, in effect, the most complete and practical "current inventory" of the principal plant items, accounting for 75 to 85 per cent of the company's investment in the plant, the balance of such investment being due to items which are not shown in these records by reason of their relatively lesser importance both from operating and investment standpoints. The engineering records used for operating purposes are maintained up-to-date by revisions from completion drawings, testing reports and similar construction records, and are automatically verified and corrected in connection with their use.

Written records, such as apparatus cards and pole inspection cards, usually are not destroyed when the item they describe has been retired and are instead kept in a "dead" file. Information relative to the dates of installation of existing as well as retired plants, together with the dates of removal of the latter, could serve for purposes of retirement or depreciation studies, particularly in conjunction with performance or maintenance data available in the written engineering records.

Maintenance of the foregoing records by the company's engineers obviously cannot be discontinued, and all statistical records which would be created for accounting purposes must be reconciled with them in order to prevent major discrepancies. It seems more practical, therefore, to prepare whatever statistical records may be needed for accounting purposes direct from the data given in the engineering records, rather than to prepare statistical records from other sources and check them subsequently against engineering records.

Limitations of Engineering Records in Respect to Details

The foregoing use of the engineering records, however, imposes limitations on

FORM OF
CONTINUING
PLANT RECORD
FOR
ELECTRIC UTILITIES
BASED ON
COORDINATION
OF
ENGINEERING AND ACCOUNTING RECORDS AND PROCEDURES

GEORGE M. WESSELHOEFT
ENGINEER
DAY & ZIMMERMANN, INC.

KEY TO NUMBERS SHOWN IN PLANT RECORD BLOCK

GRAPHIC RECORDS
1-"AREA SERVED" MAP
2-"LAND PLAT" DRAWINGS
3-"RIGHT OF WAY" MAPS
4-"POLE PLAN — ELEVATION" DRAWINGS
5-"EQUIPMENT ARRANGEMENT" DRAWINGS
6-"SINGLE LINE" DIAGRAMS
7-"TRANSMISSION CIRCUIT" MAPS
8-"PRIMARY CIRCUIT" MAPS
9-"SECONDARY CIRCUIT" MAPS
10-"STREET LIGHTING CIRCUIT" MAPS
11-"MISCELLANEOUS CIRCUIT" MAPS
12-"POLE LOCATION" MAPS

WRITTEN RECORDS
13-"STATION APPARATUS" CARDS OR LISTS
14-"CABLE LENGTH" LISTS
15-"DISTRIBUTION TRANSFORMER" CARDS
16-"STREET LIGHT EQUIPMENT" CARDS OR LISTS
17-"CUSTOMER METER" CARDS
18-"STREET OPENING RECORD"
19-"POLE INSPECTION" CARDS
20-"GENERAL EQUIPMENT" CARDS OR LISTS

LEGEND
GRAPHIC IDENTIFICATION ■
WRITTEN DESCRIPTION AND REFERENCE TO CONSTRUCTION RECORDS ●

ENGINEERING
JOINT
ENGINEERING AND ACCOUNTING
ACCOUNTING
CONSTRUCTION RECORDS OF PLANT
GRAPHIC
WRITTEN
DESCRIPTION
Details
Layouts and diagrams such as building layouts, layouts of conduit and cable work in streets and single line diagrams.
Detail drawings, either special or standard, showing details necessary for preparation of bills of material and detail assembly instructions for construction work in accordance with the details of the design.
Written
Reports of inspection and tests after completion of work.
Detail specifications, bills of material, joint ownership agreements and property deeds.
PLANT RECORDS CURRENTLY USED FOR OPERATING PURPOSES
GRAPHIC RECORDS — MAPS, DRAWINGS & DIAGRAMS
WRITTEN RECORDS — CARDS & LISTS
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
JOB CONTROL SUMMARY
PLANT ITEMS
QUANTITIES FROM LAYOUT AND REPORTS
COST
Book
Detail by Lines or Areas
Book
Book & Total for Like Items
Total for Like Items
Take-off & Tally
Tally
Take-off & Tally
Tally
Take-off & Tally
Tally
Take-off & Tally
Tally
Book
Total
Layout and Design of Land
Rights of Way
Station & Substation Buildings
Poles & Principal Auxiliaries
Wires & Principal Auxiliaries
Pole-Mounted & Principal Auxiliaries
Station & Substation Electric Apparatus
Underground Conduit & Manhole Arrangement
Underground Cables & Devices
Distribution
Distribution Transformers
Street Lighting Equipment
Services
Meters
Conduit & Manhole
Towers
Poles
Miscellaneous General Equipment
Minor Station Apparatus & Piping
Shops, Labs., Roadside Details, etc.
Miscellaneous General Equipment Items
PLANT RECORD CONTROL SUMMARY
VERIFICATION BY PERIODIC PHYSICAL INVENTORY OR OTHER OPERATING RECORDS
QUANTITY
SPOT-PLANNING
PLANT ITEMS
QUANTITIES FROM OPERATING RECORDS
COST
RATIOS
Book
Detail by Lines or Areas
Book
Book & Total for Like Items
Total for Like Items
Take-off & Tally
Tally
Take-off & Tally
Tally
Take-off & Tally
Tally
Take-off & Tally
Tally
Book
Total
Layout and Design of Land
Rights of Way
Station & Substation Buildings
Poles & Principal Auxiliaries
Wires & Principal Auxiliaries
Pole-Mounted & Principal Auxiliaries
Station & Substation Electric Apparatus
Underground Conduit & Manhole Arrangement
Underground Cables & Devices
Distribution
Distribution Transformers
Street Lighting Equipment
Services
Meters
Conduit & Manhole
Towers
Poles
Miscellaneous General Equipment
Minor Station Apparatus & Piping
Shops, Labs., Roadside Details, etc.
Miscellaneous General Equipment Items
DIRECTLY ASSIGNED TO PLANT ITEMS - 70%
ACCOUNTED FOR IN DETAIL 50%
NOT ACCOUNTED FOR IN DETAIL 20%
ALLOCATED BURDEN - 30%
JOB LEDGER
REFERENCE
Number or symbol identifying job
MATERIAL TICKETS
LABOR TICKETS
VOUCHERS
MATERIAL
LABOR
GENERAL EXPENSE
OTHER
CUMULATIVE TOTALS
000.00
000.00
000.00

the degree of details in accounting for the existing plant in that less important plant items which comprise from 15 to 25 per cent of investment cannot be derived directly from the operating engineering records. These details could be obtained, however, from construction drawings, but any attempt to maintain an inventory of these items would unavoidably result in a fictitious record due both to errors in the current entries and to omissions of details non-essential from an operating standpoint, especially in connection with emergency replacements. The errors, moreover, are cumulative and not compensating in character and may be of considerable magnitude.

Estimating Essential in Cost Accounting

The new Uniform Systems of Accounts provide for the use of estimates both in connection with the original cost determination and in accounting for retirements; they likewise provide for use of average costs in this connection for items too numerous to be accounted for individually. This is logical, for the reason that cost accounting is impossible without recourse to estimates, particularly in the matter of allocation or apportionment of "burden" or "indirect" charges. Moreover, the most advanced cost accounting methods go even further in the matter of use of estimates and provide for the use of estimated "standard costs" of units of output, the total cost accumulated on this basis being reconciled with the total charges and credits posted as a matter of general accounting only at stated periods. The importance of engineering contribution is thus greater in proportion to the improvement of cost finding procedures.

Coordinated Engineering and Accounting Plant Record

The Plant Record, resulting from a coordinated use of construction and operating engineering records and work order and plant ledger accounting records, is represented on the accompanying chart. The summary correlation of the respective engineering and accounting records is effected for each Work Order on a "Job Control Summary" and for the property as of any given date on "Plant Record Control Summary."

The "Plant Record Control Summary" is merely a control of engineering records used for operating purposes with respect to plant items and of the plant account ledgers with respect to cost. Its main function is two-fold: first, to provide a condensed summary of plant items and related costs, and second, to prevent divergence between accounting and engineering records arising from erroneous posting of charges and credits. It should always show net quantities of plant items and amounts, with sheets replaced from time to time as charges for additions and credits for retirements are posted on the Plant Account Ledger. The insertion of new sheets showing plant items and costs subsequent to construction changes and the voiding of superseded sheets should be approved both by a responsible accountant and by the engineer having responsible charge of construction work producing the change. The two signatures of the respective representatives of the accounting and engineering departments are tangible evidence of the effected coordination and enable the management to rely upon both the accounting and engineering personnel for immediate support of the Company's plant investment in such emergencies as temporary rate cases, valuation proceedings and compliance with the requirements of such other regulatory bodies as the Securities and Exchange Commission.

If engineering records are adequate, then the "Plant Record" briefly described above will require only a minimum of special effort for its creation and maintenance and will be merely a by-product of better systematized engineering and accounting procedures.

Conclusions

In setting up the new Plant Record on original cost basis determined by a combined audit and estimate, only those details should be shown which are specifically available in the currently useful engineering records. Experience in checking statistical records of the inventory type which have been maintained in great detail by certain utilities for a number of years, primarily as an aid in preparing retirement estimates, indicates that such records while accurate and reasonable at the time of their establishment tend over a period of years to become fictitious rather than real, despite the expense and effort required for their maintenance. All the items not normally shown on engineering records used for operating purposes should be treated as elements of cost rather than as plant items.

If engineering records are incomplete, they should be expanded, and an overall estimate of the cost of omitted plant items for which records are temporarily unavailable should be made provisionally.

The record of plant items and related costs created on the foregoing basis would be more nearly in accordance with the New Hampshire Commission requirements in respect to "Units To Be Shown in Continuing Property Record" rather than with the list of "Units of Property" promulgated by the Federal Power Commission for the purpose of distinguishing between maintenance and plant account charges for replacements. In order to meet the Federal Power Commission's requirements, the cost of plant items smaller than those shown in the current engineering records and Plant Record Summary would be estimated at the time of retirements, on the basis of construction data to be made available in the current Work Order records.

Current maintenance of the Plant Record should be a routine function of Work Order procedure, rather than a matter of special inventory and analysis effort. The necessary modification of the work order procedure should be made as far as possible with a minimum amount of changes to forms and routines and with the least disturbance of the ingrained habits of the personnel, in order that the procedure may be sympathetically accepted and easily absorbed into the daily operations of the organization. While practical considerations will require compromises, the fundamental principles of a coordinated procedure must be carefully adhered to.

Continuous and complete record of plant investment and operating costs is unquestionably the underlying concept of the new regulatory requirements. A detail record of plant items based on field inventories and storeroom issue quantities may be acceptable to the commissions as a first step towards more rigid and comprehensive cost finding. However, provisions necessary for carrying forward such detail record are burdensome and require special procedures if accuracy is to be insured. On the other hand, adaptation and coordination of engineering and accounting records and procedures for routine cost finding will automatically provide inventories and other cost data at minimum expense, and at the same time will give management more effective control over the costs of plant construction and operation.

PRIZES

to be administered by the

EDISON ELECTRIC INSTITUTE

AND AWARDED IN 1938

PRIZES TO INDIVIDUALS

For Papers on Subjects Relating to the Electric Light and Power Industry

BYLLESBY PRIZE . . . . . *Accounting*

Cash prizes of $100, $50 and $25 donated by Public Utility Engineering and Service Corporation, in memory of Colonel H. M. Byllesby, for the three most meritorious papers on any Accounting subject relating to the Electric Light and Power Industry.

FORBES PRIZE . . . . . *Public Relations*

A cash award of $250 donated by Mr. B. C. Forbes, Editor, Forbes Magazine, for the most meritorious paper dealing with the subject of Public Relations in the Electric Light and Power Industry.

LINDEMANN PRIZE . . . *Electric Cookery*

Cash prizes of $150, $100 and $50 donated by Mr. A. L. Lindemann, President, A. J. Lindemann and Hoverson Company, for the three most meritorious papers dealing with the Advantages of Electric Cookery for Domestic Purposes.

McGRAW PRIZE . . . . . *Engineering*

Cash prizes of $250, $150 and $100 donated by Mr. James H. McGraw, Honorary Chairman, McGraw-Hill Publishing Company, for the three most meritorious papers on any Engineering or Technical subject relating to the Electric Light and Power Industry.

RULES AND CONDITIONS OF CONTESTS FOR PRIZES TO INDIVIDUALS

Any person employed by an electric light and power company is eligible to enter the competition. No person is eligible to win two years in succession the identical prize or lower prize of the same award, but is eligible for a higher prize of that award. Papers must be the original work of the author or authors, prepared exclu-

The first page of the manuscript must give the following information: the name of the prize for which the paper is submitted, title of paper, name of author, name and address of employing company, title or character of position and home address. One paper may not be submitted for more than one prize.
Papers not receiving awards will, upon request, be returned to con-

PAPERS FOR ABOVE PRIZES MUST BE FORWARDED, IN DUPLICATE, BY MARCH 1, 1938

award, but is eligible for a higher prize of that award. Papers must be the original work of the author or authors, prepared exclu-

character of position and home address. One paper may not be submitted for more than one prize.
Papers not receiving awards will, upon request, be returned to com-

PAPERS FOR ABOVE PRIZES MUST BE FORWARDED, IN DUPLICATE, BY MARCH 1, 1938

PRIZES TO COMPANIES AND INDIVIDUALS

For Accomplishments in Specified Activities

CHARLES A. COFFIN AWARD

Sponsored by the General Electric Company

A Gold Medal, known as the Charles A. Coffin Medal, will be awarded to the public utility operating company within the United States which, during the year 1937, has made a distinguished contribution to the development of electric light and power for the convenience and well being of the public and the benefit of the industry. The company awarded the medal will also receive $1,000 for its employes' benefit or similar fund.

GEORGE A. HUGHES AWARD

Domestic Electric Cookery Load

A trophy donated by Mr. George A. Hughes, President, Edison General Electric Appliance Company, Inc., to the public utility operating company within the United States which, during the year 1937, has shown the greatest contribution to the development of the Domestic Electric Cookery Load through promotion, or selling, or both, and cash prizes totaling $1,000 to the individuals responsible for the achievement.

AUGUSTUS D. CURTIS AWARD

Lighting of Buildings

A certificate donated by Messrs. Darwin Curtis and Kenneth Curtis, of Curtis Lighting, Incorporated, in memory of Augustus D. Curtis, to the public utility operating company within the United States which, during the twelve month period ending March 1, 1938, has shown the greatest contribution to the advancement of Artificial Illumination of interiors or exteriors of Commercial and Public Buildings, and a cash prize of $300 to the individual or individuals in that company responsible for the achievement. A second prize of $200 and a third prize of $100 to the individual or individuals responsible for the achievement of the companies adjudged second and third in the contest.

THOMAS W. MARTIN AWARD

Rural Electrification

A bronze plaque donated by Mr. Thomas W. Martin, President, Alabama Power Company, to the public utility operating company within the United States which, during the year 1937, has shown the greatest contribution to the advancement of Rural Electrification-Agricultural advancement within the company's territory due to uses of electricity, development of rural load, cooperation with other agencies, extension of rural lines, organization and plan for conducting rural electric development.

IMPORTANT—Complete details for the Charles A. Coffin Award, the Augustus D. Curtis Award, the George A. Hughes Award, and the Thomas W. Martin Award should be secured from the Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

Elaborate and costly exhibits are unnecessary. The merit of the enterprise presented in papers or exhibits will be the prime factor in determining awards, without regard to the size of competing companies.

PRESENTATIONS OF ACCOMPLISHMENTS MUST BE FORWARDED BY APRIL 1, 1938

Papers and exhibits for 1938 prizes should be addressed to the Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y. Winners will be announced and prizes awarded at the 1938 Convention of the Edison Electric Institute

PRIZE AWARDS COMMITTEE: Charles W. Kellogg, James E. Davidson, H. P. Liversidge, *Chairman*, Lewis B. Beatty, *Secretary*

Current Developments in the Utility Industry

By Bernard F. Weadock

Vice-President and Managing Director of Edison Electric Institute

An address before the American Life Convention, Chicago, Ill., Oct. 12, 1937

AMONG the investors in the electric light and power industry, life insurance companies are prominent. It is reliably stated that the ratio of public utility securities to total admitted assets, almost exclusively of operating companies, was 10.8 per cent. The securities of the electric light and power industry help constitute the assets behind almost 33 million ordinary life insurance policies and secure in a sizable amount over 40 million depositors in savings banks throughout the nation, while the same securities are the bulwark of many endowment funds for educational, charitable and other eleemosynary institutions.

It therefore seems appropriate and timely that you should request some information upon the effect of government competition upon the electric light and power securities.

In order to fully understand the extent of the electric light and power industry, a little of its history may be of interest. The electric light and power companies are an essential part of the electrical industry. The electrical manufacturers, electrical dealers, electrical contractors, the 3 to 5 million electrical investors are as essential to the completion of the picture of the industry as are the 25 million customers. Time will not permit of a discussion of the industry as a whole.

There are some 1650 private operating companies of record in the electric light and power industry. They engage a personnel of over 270,000 people, who constitute an army ready day and night to serve the people intelligently, efficiently, honestly and fairly. These companies are quasi-public in character with well-defined public obligations and responsibilities. Briefly, they are: first, adequate and efficient service at all times; second, that the rates for such service be reasonable and fair; and third, that its financing be conservative and honest. These three obligations are all interdependent.

Adequate and efficient service cannot be rendered unless rates for such services are as reasonable and fair to the customers as they are to the company. A starved horse cannot perform efficient service; neither can a utility company fully meet its public responsibility by selling below cost, and unless the financing is conservative and honest, there eventually appears a buyer strike which soon renders it impossible to attract new capital for the improvement or expansion of service. It must be remembered that the electric light and power companies were created to supply a new and romantic service to the people. Today, after fifty years of growth, romance has been superseded by actualities. Electric service is almost universal. It serves the largest cities and the smallest hamlets with equal efficiency. More dwellings in the United States have electric service than have running water and there are more miles of rural electric lines than there are miles of rural surfaced roads. 1,000,000 additional farms have been served by privately owned electric utilities since the year 1919. Today 1,150,000 farms are served and it is estimated that 200,000 additional farms are adjacent to rural electric lines but have not yet taken the service. That American industry has made great progress in its electrification is best attested by figures obtained from the U. S. Census of Manufacturers for 1929, which shows that on Dec. 31, 1909, 9 per cent of all power in factories was electrified and that in 1929 this had increased to 53 per cent.

The electric utilities today are better prepared through organization and technical skill to supply the present and prospective demand for electricity than ever before. At the present time, in general, there is ample capacity with adequate reserves for supplying the existing market, and installations are under way to take care of the increased demands for electricity reasonably in prospect. There are 22 million domestic customers throughout the United States. The companies throughout the country have been and are aggressively engaged in increasing the uses of electricity and these campaigns have been most successful. The future uses upon which the companies are centering their study consist in part of electricity for industrial heating, industrial lighting, air conditioning and expansion of electricity in manufacturing and industrial processes. The present use of electricity extends from propelling a cumbersome dredge to operating the most delicate mechanisms known to man. This record of accomplishments is unequalled in any other industry anywhere.

The price of electric energy has been reduced almost continuously since the beginning of the industry. The average price per kilowatthour to the domestic consumer in 1913 was 8.7c. and is under 4.5c. at the present time. This is a reduction of about 50 per cent. During that same period the cost of living has increased by 50 per cent and taxes have increased in a greater amount. These reductions in rates are general and apply to the smallest communities as well as the largest. The reduction in rates has not been confined to the domestic consumers but extended to industry and the farmer as well. The farm rate in 1926 was 8.85c. per kilowatthour. Today the price is less than 5c. per kilowatthour.

These accomplishments have required large amounts of capital. During and following the World War a greater appreciation of the value of electric service was most noticeable. To meet the increased demand, additional facilities were required. To build the additional facilities, new capital was likewise required. This demand for expansion continued for some time. The utilities met their obligation by raising sufficient capital to construct adequate facilities to maintain reliable and dependable service.

Some harsh and unjustifiable criticism has been directed at utility financing. The complete record should silence such criticism. The utilities of which I speak have assets of $1.13 for each dollar of outstanding securities. If this is not sufficient proof of the soundness and honesty of the financing, your attention is called to the fact that less than 1 per cent of the senior securities of the operating companies have been in default during the depression and that less than 10 per cent of preferred stocks were at

any time in arrears on dividends at even the lowest point of the depression.

Since the completion by the public utilities of their heavy construction program undertaken at the close of 1929, very little new capital has been required. The comparatively small amount of money spent from 1932 to date for additions and betterments has been largely supplied by the net additions to the depreciation reserve and by the diversion of some of the earnings of the business which might rightfully have been paid to the stockholders. It is evident that even with construction budgets at half a billion dollars in 1937, little new capital is being raised. New capital for the first nine months has totaled only 90 million dollars.

The *Commercial and Financial Chronicle* report reflects the general utility trend in financing. It shows that the maximum of new utility capital (including gas, telephone, traction, etc.) was required in the year 1930, and that the amount was $2,365,140,852, and this constituted 92.2 per cent of the total financing. The minimum, according to the same authority, was in the year 1933, when only $34,221,000 of new capital was raised, or 36.9 per cent of the total financing. In the year 1936 a total amount of $2,125,343,963 was raised, of which only 5.8 per cent, or $123,684,098, was new capital.

The electric light and power companies under private management over a long period of years have met successfully the tasks of promoting a market for their service, of developing and improving facilities for generating, distributing and utilizing electric energy. They have successfully raised large sums of capital which the business requires, and have been able to expand its service and reduce the cost to a very marked degree, and this in the face of higher costs of construction and operation and greatly increased taxes. Its progress in these respects made even through the worst years of the depression is evidence of the efficiency of these companies and their alertness to business opportunities. It is also evidence that there are still great possibilities ahead for electrical development and that private enterprise, if not weighted down by taxation and crippled by restrictions and unequal competition, can be relied upon yet to produce great improvement in the extension of electric service.

I have been asked to touch upon government competition and its effect on securities of electric light and power companies. Competition is not a new thing in the electrical field. Central station service began in the sharpest competition with gas lighting service and every extension of its field of usefulness has been made in the face of competition. From the beginning, privately owned electric utilities have faced competition from publicly owned electric utilities. Two municipal plants were established in the year 1882, the very year that Thomas A. Edison constructed his Pearl Street Station in New York City, and in the fifty-four years since that time, over 3900 municipally owned electric utilities selling power to the public have at one time or another been established. Less than half that number remain, however, and the private companies supply 95 per cent of the output of electricity. This competition between private and municipal electric utilities has not been on an equal footing. Municipal plants enjoy tax exemption; the taxpayers carry all credit risks, that is deficits are made up out of the public treasury and damage suits are generally against the municipality and not the municipal utility; the municipality requires no return on investment; free legal services and free services of other city departments are made use of, including free use of municipal buildings and other equipment; the municipality puts up with lower standards of service and lower standards of construction from its own utility; municipal utilities are not burdened by the elaborate system of accounts required by state and federal authorities; municipal utilities have not in general extended service to the thin outlying districts; and in recent years the Federal Government has made free grants up to 45 per cent of the cost of additions and improvements. Yet, in spite of these subsidies, Federal Power Commission Bulletin No. 5, issued Jan. 1, 1935, shows that for minimum uses the rates of the municipal plants are about 3 per cent under those of the private companies, while for larger uses the rates of the private companies are from 4 to 28 per cent over those of the typical municipal plant. Throughout the years of this competition the securities of private companies have with rare exceptions been unimpaired.

The policy of the Federal Government with respect to water power development was for many years to encourage private enterprise and in the past when electric energy could economically be developed at dams which it had built or planned to build it worked out plans that permitted local enterprises to dispose of the electric energy. The business of supplying electric service is essentially a local matter and not national in any real sense. The average distance traveled by a kilowatthour from the point of generation to the point of utilization is estimated at about twenty-two miles. This local character of the business was recognized in the previous Federal policy. With the passage in 1933 of the Act creating the Tennessee Valley Authority, the Federal Government put into effect a new policy and injected itself into the retail distribution of electricity. This policy so far has only been placed in effect in and adjacent to the Tennessee Valley but bills before Congress would create seven new TVA's covering the entire area of the country and granting to the proposed authorities powers to go into business similar to those now held by the TVA.

The effect of the operations of the TVA on the securities of the private companies supplying electric service in or near the area of its operations is clearly stated by Mr. Wendell L. Willkie, President of The Commonwealth & Southern Corporation, in his recent annual report to stockholders of that corporation. He said:

"All of our operating companies in the Southeast, representing approximately one-half of the system's property, were unable to do any refunding because of the competition, actual and potential, of the Tennessee Valley Authority. If this threat could be removed by a permanent settlement and a favorable market for low interest bearing securities obtains, savings in annual charges, like those made by our northern operating companies, could be made by our southern companies to the extent of several million dollars which could be shared with their 500,000 customers, as has been the case in the North."

President Guild of The Tennessee Electric Power Company, in his stockholders' report for the year ended Dec. 31, 1936, stated:

"The very existence of the threat of TVA raiding the business of the company has continued to depress the market values of its securities. While securities of private utilities in other areas, which are free from the threat of unregulated Government competition, are selling above par with rates approximately one-half those paid by The Tennessee Electric Power Company, the bonds and various preferred stock issues of this Company are selling below par, and some for as much as 47 per cent below par. This is true despite the fact that the Company had never failed to earn and pay its

preferred stock dividends and its business of late has had a noticeable increase."

How far this unrestrained competition, disruptive of existing efficient power systems, can legally go is not yet determined. The question of the constitutionality of the Act is now before the Federal Courts. One phase of the powers of the Authority has been adjudicated by the Supreme Court of the United States, that is, the question of the validity of a contract between the TVA and the Alabama Power Company relating to the sale of certain properties by that company to the Authority. The Court restricted its decision to the validity of the particular contract, which involved, among other things, the sale of transmission lines extending to an area within fifty miles of the dam. The Court in sustaining the contract said:

"The question here is simply as to the acquisition of the transmission lines as a facility for disposal of that energy (surplus energy) and the government rightly conceded at the bar in substance that it was without constitutional authority to acquire or dispose of such energy except as it comes into being in the operation of works constructed in the exercise of some power delegated to the United States. As we have said, these transmission lines lead directly from the dam which has been lawfully constructed and the question of the constitutional right of the Government to acquire or operate local or urban distribution systems is not involved. We express no opinion as to the validity of such an effort, as to the status of any other dam or power development in the Tennessee Valley, whether connected with or apart from the Wilson Dam or as to the validity of the Tennessee Valley Authority Act or of the claims made in the pronouncements and program of the Authority apart from the questions we have discussed in relation to the particular provisions of the contract of Jan. 4, 1934, affecting the Alabama Power Company."

This recital of government competition may sound somewhat discouraging from the standpoint of the investor in electric utilities, but if the matter is viewed in the light of the long standing history of competition between privately owned and publicly owned electric utilities, the outlook is more encouraging for the inherent superiority of private enterprise has asserted itself, as shown by the fact that private companies now supply 95 per cent of the output of electricity.

The present commercial and technical progress of the private companies is also encouraging. The uses of electricity, particularly by retail customers, are growing rapidly. The annual use of electricity per domestic customer, which was 264 kilowatthours in 1913, twenty years later, in 1933, was 593 kilowatthours and at the present time is 775 kilowatthours. It has doubled in the past twelve years. This use is primarily dependent upon the invention and development of useful and desirable electrical appliances and upon their general acceptance by the public brought about through intensive sales efforts. In recent years the electric refrigerator and the radio have been the two outstanding appliances in public acceptance but further developments, such as the new dust precipitator for industry, the installation of air conditioning and circulating equipment, the development of improved lamps and the increased sale of electricity for lighting, the growing popularity of electric roasters and similar devices, promise further increased consumption of electricity. At the same time, substantial technical progress has been made, particularly since the beginning of the depression in 1929, in fact, stimulated in part by conditions resulting from the depression. These developments now permit the industry to produce more kilowatthours per dollar of investment capital than it formerly was able to, and this is being done in spite of increased prices.

Technical improvements and market development are the fruits of private enterprise. Notwithstanding the existence of unfair government competition and the threat of further such competition, it is reasonable to expect that the privately owned electric untilities will continue to more than hold their own and it may be expected also that over a period of time their securities will hold their value.

Use of Electricity in Sweden

THIS table, from the annual statistical report of the Swedish Association of Electricity Works (*Svenska Elektricitetsverksforeningens Statistik*, 1935), shows the use and cost of residential electricity in the larger cities of Sweden and the total for all towns for which complete information is given.

RESIDENTIAL ELECTRICITY IN SWEDEN—1935

Town	Population	Customers	Average Annual Kwhr per Customer	Average Cost per Kwhr, Cents*
Boras	43,365	11,403	450	4.6
Eskilstuna	36,685	11,597	180	7.0
Gavle	39,186	12,908	162	6.8
Goteborg	258,387	90,462	244	6.2
Orebro I	39,186	17,850	202	8.9
Stockholm	533,884	179,837	444	4.9
Uppsala	33,924	11,271	258	5.4
Vasteras	32,569	11,231	227	5.7
All listed towns	1,348,408	477,756	331	5.4

In terms of the wages of a Stockholm bricklayer, electricity costs nearly 19 cents per kilowatt hour, as is emphasized by the following table, which also suggests the small advantage to be gained by learning a skilled trade under the Swedish type of managed economy.

The rates, as reported by the International Labor Bureau, show typical hourly wages in representative trades in the principal cities of Sweden as compared with New York and New Orleans.

TRADE	HOURLY WAGES IN U. S. DOLLARS*			
	Sweden		U. S. A.	
Mechanical Trades	Goteborg	Stockholm	New York	New Orleans
Filters and Turners	$0.22	$0.24	$1.00	$0.80
Iron Moulders	.22	.24	.96	.85
Building				
Bricklayers and Masons	.38	.41	1.50	1.00
Structural Iron Workers	.39	.41	1.65	1.25
Concrete Workers	.34	.36	1.40	.85
Carpenters and Joiners	.38	.41	1.40	.75
Painters	.41	.46	1.29	.75
Plumbers	.38	.41	1.50	1.05
Electrical Fitters	.38	.41	1.70	1.25
Unskilled Laborers	.34	.36	1.00	.40
Furniture Making				
Upholsterers	.38	.40	1.15	....
Printing and Book Binding				
Compositors	.36	.37	1.31	.90
Book Binders	.33	.34	1.02	.94
Food				
Bakers	.36	.45	1.00	....

* Swedish kronor converted to U. S. dollars at the rate of 1 kr. to 27¢

A Resumé of Progress of National Promotional Programs and Sales Committee Activities

By C. E. Greenwood
Commercial Director, E.E.I.

A RECESSION in business is a stimulus to commercial men. We have had an example in recent years of the possibilities of sales of electrical equipment and of kilowatt-hours even during the period of lowered incomes. The job can be done with organization and sufficient promotional funds to meet the test. National sales programs will lend stimulating power to the regularly organized committees of the Institute.

The Fall meeting of the Sales Committee to take inventory on committee personnel and plans for the administrative year was called by Chairman D. M. DeBard at the general office of the Institute on November 5. The accomplishments of subcommittees to date, together with the fact-finding projects that are scheduled were presented and approved. The meeting brought out that sales executives were fully cognizant of the problems ahead.

Following customary practice the organizational committees will direct their attention to analyses of various classifications of business, conduct surveys and develop reports on the status of the industry. All promotional features will be centered in national programs, guided by joint committees of manufacturer representatives and other groups interested in the particular services. A summary of progress follows.

Commercial Sales—P. M. ALDEN, Chairman

During the past year the Commercial Sales Committee has prepared for distribution a *Directory of the Manufacturers of Commercial Equipment Using Electricity*. A survey of sales in the commercial classification has been closed with returns representing close to 1,500,000 meters. Tabulation and summarization is now in progress and will be distributed to the membership of the Institute shortly. Interest indicated in the field of electric commercial cooking equipment influenced the decision for promotional effort on counter and pantry equipment, and a Commercial Electric Cooking Council has been organized for this purpose. Later reference will be made to this activity.

The Commercial Sales Committee is concerned with commercial loads of 25 hp and under. The list includes room cooling and ventilation, commercial refrigeration and commercial cooking and heating. During the coming months market studies are to be made in this field and a study of employee training for required specialty selling will be made. The Committee expects to act as a clearing house generally for facts and new ideas for obtaining greater energy sales from commercial customers.

Financing of Electrical Equipment—C. H. HAROLD, Chairman

A report of the finance companies issued a few months since analyzed the variety of financing plans as compiled from data supplied by numerous utility companies throughout the country. The attention of the Committee is being directed in coming months to a follow-up in its studies, and particularly to investigate the trend of financing terms contemporaneously offered by the instalment bankers, observing from time to time whether such terms are becoming more restrictive.

It was pointed out by Mr. Harold that the Sales Committee should exert its influence against swinging the pendulum too far to over-conservative bases without adequate reason. The Committee believes that the financing of major electrical equipment for the household is a superior risk to the general run of merchandise and it views with concern the recent changes in initial payments and terms which have been brought about through influence of the leading finance companies.

Already where there have been restrictions applied we find an immediate tendency for sales to drop.

It appears that there has been too little thought given to the difference between "down" payment and "serial" payment and the principle of usefulness in connection with range, water heaters and refrigerators. The resale value of these items is higher than in many other items purchased on deferred payments and under such conditions the initial payment as now being urged by finance companies is not satisfactory.

It was the sense of the Sales Committee that immediate action should be taken and the following Resolution was adopted:

The Sales Committee of the Edison Electric Institute at its meeting November 5, 1937, have received reports on the effects of the recent stiffening of terms on time sales of appliances as recently announced by the national finance companies and have noted that several trading areas have already experienced such severe recessions in appliance sales volume that local exceptions have been made effective as to down payments.

In view of the serious adverse effect upon sales volume of sharply increased down payments, and further in view of the reasonably satisfactory collection record as to past business and of the general experience that with scrutiny of purchaser credit the amount of the down payment has relatively little effect on the quality of such instalment paper, the Sales Committee believes that the present decision of the finance companies should be reviewed by them and modified particularly with respect to down payment requirements.

It is further recommended that a copy of this statement be transmitted to the principal finance companies with the request for a conference in the near future.

This Resolution has been forwarded to leading finance companies for their consideration and action.

Lighting Sales Committee—M. N. WATERMAN, Chairman

Plan for Profit was the title of a Plan Book published by the Lighting Sales Committee in May of this year in order to stimulate interest in utility and manufacturer cooperative sales activity locally. The reception to this presentation of the Committee has been gratifying considering that no attempt has been made for national promotion. It was offered primarily for local stimulation. It is of particular interest that this program was presented before the Store Modernization Conference at Chicago.

The Committee has been preparing for its next report on *Better Seeing in Schools*. Information has been obtained from over one hundred utility companies and is now being summarized. The

report that will follow gives useful data on present school lighting practice and information on methods which have proven successful in presenting *Better Light-Better Sight* to school authorities. An indication of the condition in lighting installations in schools may be had from the accompanying chart showing class-room foot-candles.

It is recognized by lighting men that the extensive market for additional lighting in all classifications cannot be tapped effectively without a well organized and well trained sales organization. A study along this line has been completed and publication should follow within the next few weeks.

Other projected studies are the preparation of information on highway lighting, especially the installation of highway illumination to promote accident prevention. This phase of the lighting development is a matter of education. Also there will be further investigation of the inter-relation between good lighting and air conditioning design. There is opportunity for cooperative selling by both groups.

Wiring Committee — J. D. NOYES, Chairman

The praiseworthy accomplishments of the Wiring Committee are seldom recorded in a report, but now in view of the wide interest in wiring promotion, the Committee has in mind a report on wiring adequacy and the relation of new wiring practices. Wiring activity is tied up with the building industry. Low-cost housing is to be intensively developed. It is believed that new developments in the wiring field can be sold on their merits to all branches of the industry. The Committee sees in this a possibility of definitely increasing adequacy without reducing the total cost of wiring or the contractor's overhead and profit.

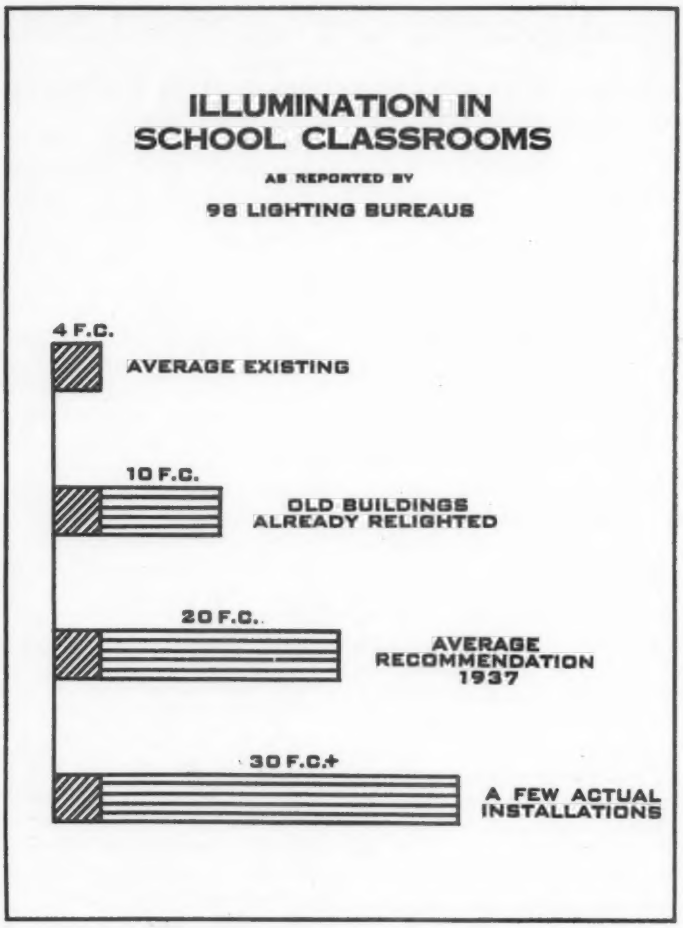
Chairman Noyes brought out the thoughts of the Committee in connection with new wiring developments which will be one answer to the attainment of higher intensity illumination which we are trying to sell in commercial buildings. It will be the purpose of the Committee to carry on the experimental work in the interest of a greater electrical business for all branches of the industry.

Industrial Power and Heating Committee—J. F. GASKILL, Chairman

To quote Chairman Gaskill:

"Industrial sales have been going through a transition over the past few years. For a long time it was possible to survey the industrial market by counting the factory chimneys. A salesman then called at the main office, and from there went to the engine room. The possible market within the factory was almost, if not completely, overlooked.

"The isolated plant market has nearly disappeared but the habit of many years has, in a great many cases, kept the mind of the power salesman in the engine room. The best way must be found to evaluate the large diverse and complicated market which lies within the factory. Some way must be found to get the power salesman's mind out of the engine room, and the best methods of sales promotion must be developed in order to get the most out of the market."



The new projects of the Power Committee will be directed primarily toward these problems. Among the projects now under way is investigation of trends in different phases of competition and a study of case histories in this connection; a survey of the load building possibilities in the oil refinery field; a report on melting furnaces which will be based on questionnaires sent out last year.

In past years reports have been prepared by our Association showing operating records and diversity in costs of Commercial Cooking and Baking, and it is the purpose of the Committee to analyze these and bring the information to date. There has been a question in the minds of the Committee of the value of the Power Sales Items in the BULLETIN and these are to be omitted until further notice.

The very complete program of this group will be filled out by the establishment of a clearing house for data covering analysis of the potential market; a study of methods of training power sales personnel, and consideration of the appointment of a sub-committee to cooperate with the American Welding Society with the ultimate purpose in mind of cutting down the disturbances caused by welding equipment.

Air Conditioning—Equipment Division —E. A. FREUND, Chairman

Air conditioning service has come to the forefront with its rapid growth and comfort giving value. Air conditioning

equipment is of concern to us in all classifications of service supplied by the utility. The load factor of air conditioning installations is of vital importance. Therefore the Air Conditioning Equipment Committee is collecting all available data that will assist in forwarding the improvement of load factor. A number of installations have been made in various sections of the country which promise interesting and gratifying results.

A study of the Interim Code of the Air Conditioning Manufacturers Association has been in progress and it is hoped that the permanent code will be drafted and completed during the coming year.

Air Conditioning — Promotional Division—W. G. MOORE, Chairman

Also working closely with the manufacturer group is the Committee on the promotion of air conditioning. One of the major activities in the coming months will be the encouragement of coordination of sales promotional activities of utilities and manufacturers to give full power to results. Room Coolers have been perfected to the point that would justify intensive sales activity in view of broader application in the domestic and commercial fields. The collection of data and sales promotional methods used by different companies will be continued.

A joint meeting of both Air Conditioning Committees is scheduled for late November.

Rural Sales—R. K. DERRY, Chairman

Acting as a fact-finding body through its membership serving as sectional representatives, the Rural Sales Committee has served as a clearing house for individual company's activities. Information has reached the industry through the medium of *Rural Electrification Exchange* which is now familiar not only to the electrical industry, but to all groups concerned in the electrical development in rural communities. The *Exchange* was published bi-monthly during 1937.

It is gratifying to announce that this publication will try to extend its field of usefulness with a new format and letterpress printing starting in January, 1938. At least quarterly issues will be published. Each member company will receive a free copy, and additional subscriptions may be had at 5c a year to cover printing expense.

E. A. Snyder of American Gas and Electric Company, New York, will serve as Editor of the *Exchange*.

The Committee proposes to continue its fact-finding and will consider rural load building from a broad point of view rather than restricting its activities to the promotion of any one group of appliances.

Electric Range — A. C. MCMICKEN, Chairman

The promotional phases of domestic electric cooking having been placed under the Modern Kitchen Bureau. Chairman McMicken who succeeds H. P. Megargee as Chairman, is organizing for consideration of load building problems surrounding electric range promotion. A very important one, that of servicing ranges sold by both utilities and dealers, is becoming serious in communities with high saturation. In these communities in particular new and untried ranges are coming into the market to complicate the situation. A study of these costs, and recommendations in connection thereto, will be a helpful contribution which the committeee will undertake.

It is also recognized that annual revenue from ranges is steadily declining. This brings up new promotional angles on which deliberation is essential.

As is the case of other specialties, the electric range demands skilled salesmanship. Dealers are becoming important factors in the marketing of ranges and it is timely that a program of educating and training their salesmen should be worked out with utility leadership. Granting that manufacturer and distributor representatives are doing their best to train dealer salesmen, the high turn-over makes the job more difficult. The Committee is taking under consideration the publication of a salesmen's handbook as a ready reference and sales guide.

Electric Water Heating Committee—K. M. ROBINSON, Chairman

In the absence of the Chairman, R. H. Fite brought to the meeting on behalf of Mr. Robinson a report of the proposals for promoting water heating during 1938. The industry program organized under the Kitchen Modernizing Bureau will be continued and expanded. The objectives are to stimulate utilities, dealers, and retail salesmen's interest in water heating selling and to create consumer interest in electric water heating.

There will be six activities stimulated by Contests. Tentative plans are to have an offer of $500 for the best paper on the subject *Advisability of Competitive Water Heater Rate and Advantages of the Water Heater Load.* Another Contest will be for the best series of newspaper advertisements on electric water heating for which there will be $400 in prizes. A third Contest will be on window display with prizes totaling $250. Then there will be a twelve-months' Contest with three monthly prizes of $10 each for the best letters submitted by retail salesmen on *How I Sell Electric Water Heaters.* There will be 36 monthly prizes of $10 each and one grand prize of $50 and a free trip to the regional E.E.I. meeting in the winner's territory.

Naturally the promotion of these Contests will require trade paper advertising and publicity. The complete program will be rounded out by employee activities and suggestion for consumer Contests.

Electric Refrigeration Committee—A. A. BROWN, Chairman

Like the Water Heating and Range Committees, the Refrigeration Committee in its promotional effort has functioned as a unit of the Kitchen Modernizing Bureau. During the past year, through addresses made to trade groups and through articles in the trade press, it has been urged that all manufacturers, dealers, and utilities handling electric refrigerators concentrate their efforts on selling the constructive features of electric refrigeration rather than disparaging competitors.

Whether as a result of this or not, it is interesting to know that the manufacturers sponsored trial campaigns in Dallas and Oklahoma City. These campaigns were started September 3 and ran six weeks. No inducements were offered to the customers, such as low prices, easy terms, etc., but all salesmen were instructed to emphasize the value of electric refrigeration to the owner, and all told substantially the same sales story. The advertising which was used in connection with these campaigns was very constructive, especially from the standpoint of public utilities.

In spite of the fact that this campaign started in Oklahoma City right after the close of a very successful refrigeration season, sales during the six weeks were 36 per cent greater than for the same period the previous year.

The Refrigeration Division of the National Electrical Manufacturers Association, in addition to contributing toward the overhead expenses of the

Kitchen Modernizing Bureau, has decided to contribute a substantial amount in 1938 for specific refrigeration promotion in the name of the Bureau.

Details of the promotional plan to be worked out will be decided upon at an early date. It is possible that campaigns, very much along the lines of the campaigns recently conducted in Oklahoma City and Dallas, will be conducted in certain selected markets which seem to need special attention.

NATIONAL PROMOTIONAL PROGRAMS

Better Light-Better Sight—M. E. SKINNER, Chairman

Mr. Skinner reported that the Better Light-Better Sight Program, was proceeding smoothly and effectively. Of special significance is the increased interest and participation by members of the medical and optical fraternity. Since the address of Dr. Morris Fishbein before the Edison Electric Institute Convention last June 100,000 reprints of his talk have been distributed through the Bureau and at the present time a series of articles emphasizing the relationship of light and sight is being run in the magazine *Hygeia,* which is the official health publication of the American Medical Association. These articles written by authorities in the medical profession are expected to expand interest in the Better Light-Better Sight Program, and particularly among physicians, eyesight specialists, educators and parent-teacher groups.

Mr. Skinner injected a word of caution against a preponderance of selfish interests in carrying on activities by various associations and groups. He reflected the opinion of the Executive Committee of the Bureau when he urged that the educational aspects be continued uppermost in promotion and advertising particularly by utility interests. It has been by the educational and welfare approach that the program has made its success with the public and any let-down in this respect will retard the progress of the movement.

The report indicated that this fall and winter greater efforts than ever on Better Light-Better Sight are being made by utilities. Not only is this judged by the increasing demand for promotional materials through the Bureau but for materials made available by General Electric and Westinghouse lamp companies. As some indication the Bureau has so far this Fall distributed over 1,000 mats of newspaper advertisements, 200,000 Better Sight Pictorials, 100,000 question and answer charts, in addition to numerous other folders, cards, etc.

The new sound slide film entitled "Lights-Camera-Action" is being accepted widely with over 75 utilities purchasing sets during the first three weeks since its release.

Mr. Skinner referred to the national movement to honor Helen Keller for her efforts in helping in the prevention and the relief of blindness which is expected to culminate in a National Helen Keller Day to be proclaimed by the President next March 3.

The report stated that the growth of scientifically designed lamps meeting IES specifications is increasing rapidly. As of last August 2,700,000 lamps with approval tags had been sold and the estimate for this year is 1,500,000. It is further believed that an equal volume of these lamps meeting the effectiveness requirements features of the IES specifications have been sold without approval tags.

Commercial Electric Cooking Council—P. M. ALDEN, Chairman

This Council is the baby of the national programs and was organized jointly with the Food Equipment Section of NEMA because there seemed to be a definite job before the industry in promoting the sale of commercial electric cooking equipment, particularly of the counter and pantry variety. Plan Books have been distributed to utilities, leagues and others through the Institute and cooperative manufacturers have mailed these to hundreds of distributors and dealers.

There is a fund of information in the Plan Book and numerous suggestions for organization of tangible effort locally. Two attractive direct mail pieces are offered which can be purchased at a nominal price. These are promotional in character. The Council will continue to stimulate active coordination between the utilities and manufacturers in the development of the counter and pantry devices and promote closer cooperation between the utilities and dealers locally.

An indication of the interest in this profitable load was in the attendance of between sixty and seventy men who attended a meeting under the auspices of the Council during the Convention of the National Restaurant Asssociation at Chicago. A similar meeting is called during the National Hotel Show on November 18 in New York.

Electrical Housewares Program—H. P. J. STEINMETZ, Chairman

The Electrical Housewares Committee is closing up the fourth year of its activity to encourage new interest and more intensive promotion of the table cookery group of small appliances. *Electrical Gift Month* in June and *Electric Buffet Entertaining Month* in October were the two concentrations for the year. For the first time in this program there was national advertising with a full-page in color in the June issue of *House Beautiful* and the October issue of *Better Homes and Gardens.* A feature of the tie-in material for October was a booklet on *Electric Buffet Entertaining* which has been widely distributed. It is a consumer booklet which sells the idea of USE. The Committee will promote its sale throughout the winter months.

In addition to this booklet a bill stuffer was prepared. There was an attractive dealer poster prepared for *Electric Buffet Entertaining Month* which carried on the reverse side the terms of a contest on table settings using table cookery appliances. Cash prizes were offered to the winners.

Running Water Program—P. H. POWERS, Chairman

Although the activities of the Electric Water Systems Council were to close in the present calendar year, there has been an urge on the part of the electric water systems group of the Pump Manufacturers Association, who formed jointly with the Institute representatives the Council to operate this activity, to continue with the good work. Not only has there been a solidifying of promotional effort between utilities and pump dealers locally but sales have increased rapidly as a result of the program. It was unfortunate to receive the resignation of Mr. Powers who has been the leader in this activity over the four years of its operation. An early meeting is to be held by the Council to expand its membership and outline plans for 1938.

Kitchen Modernizing Bureau—G. E. WHITWELL, Chairman

It was extremely gratifying to have an enthusiastic report on the permanency and expansion of the program of the Kitchen Modernizing Bureau. Although the Executive Committee of the Bureau will not meet until early December, the Range, Refrigerator and Water

Heating Sections of NEMA have advised Mr. Whitwell of the action taken at recent meetings of these groups in Chicago. Chairman Whitwell appeared before them to give account of his stewardship, and the action of the manufacturers may be considered a tribute to confidence in his leadership.

This has naturally been the most complicated of our national activities. Our other outstanding program — Better Light-Better Sight — is forging ahead with effectiveness with a service that is accepted by all utilities. The obstacles in the path of the Kitchen Modernizing Bureau have been surmounted to a large degree. The Bureau has had a background of two years' experience and some effective results. The Report of the Bureau recently published has received wide publicity. When just 23 utility companies with the Kitchen Modernizing approach sell nearly 10,000 combination sales of refrigerator, range and water heater and approximately another 16,000 sell refrigerator and range combination, all representing a minimum of $5,500,000 worth of equipment, then we know that we have substantial foundation on which to build. One of the very active companies has advised that the Kitchen Modernizing activity produced an average of 1¾ units per sale.

Although an announcement here of the plans for 1938 would be premature, suffice it to record that product advertising will supplement the general background of the modern kitchen theme. In connection with some services there will be national advertising; numerous contests are planned, an enlarged field force and the activity will be organized for three years. The new name will be the Modern Kitchen Bureau.

Adequate Wiring Program

A national activity to promote adequacy in wiring has been developed by NEMA acting with other industry groups over the past several months and the Adequate Wiring Bureau was formed. The Institute was invited to appoint two utility representatives to serve on this Bureau and at the last meeting of the Sales Committee M. E. Skinner of Buffalo and C. A. Eastman of New York were appointed.

Recognizing the success of a program of this kind would depend upon the interest and the ability of the utility company to forward it, the Bureau has been harmonizing diverse interests in order to get greater support for this industry movement.

Mr. Skinner reported that he now had the final draft which a Plan Committee that had been appointed had submitted and he expected it would be approved at the December meeting of the Bureau. The objective of the Bureau is to correlate efforts so as to increase their effectiveness. The national activity will have flexibility and the entire program will really consist of a lot of local activities.

There will be a "Certification" plan for those who wish to operate one similar to the one followed in the Red Seal activity of some years ago. An emblem and slogan has been developed, also a series of twelve direct mail leaflets on wiring which can be utilized by all branches of the industry if they organize cooperatively. These tie-in to a comprehensive booklet entitled *Copper in the Home*. Other publicity items are newspaper advertising mats, sound slide film, lecture material, radio spot announcements, counter cards, window displays and other items.

A general announcement will be expected from the Bureau following the final adoption of the National Plan.

Sales Conference

Tentative dates set for the Annual Sales Conferences are the week of March 28, 1938, at Chicago.

Rural Electric Service in Ontario

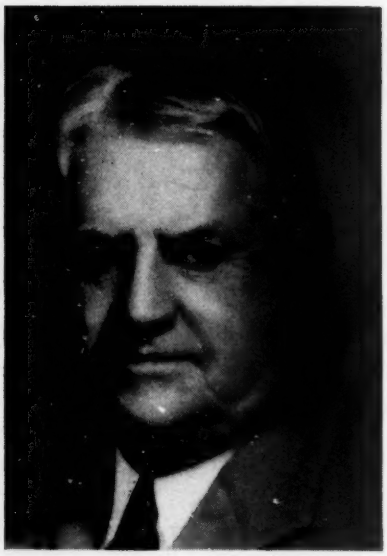
THE following table shows the development of rural service (farms and hamlets) on the lines supplied by the Hydro Electric Power Commission of Ontario. This information is from "Use of Hydro Shows Steady Growth," by G. J. Mickler, in the *Bulletin* of the Hydro Electric Power Commission of Ontario, Tables IX and X, p. 278.

Year	Total Farms and Hamlets Customers	Kilowatt hours	Revenue	Average Per Customer Kwhr per Year	Cost per Kwhr
1928.....	26,894	21,671,859	$1,099,414	806	5.07c.
1929.....	33,824	30,447,612	1,441,047	900	4.73c.
1930.....	41,024	38,323,050	1,621,363	934	4.23c.
1931.....	51,972	47,843,615	2,102,778	920	4.40c.
1932.....	56,070	53,329,786	2,330,563	951	4.15c.
1933.....	59,224	55,472,664	2,442,492	937	4.40c.
1934.....	61,348	61,080,774	2,469,800	996	4.04c.
1935.....	65,108	68,469,743	2,515,095	1,052	3.67c.
1936.....	71,212	81,113,910	2,624,795	1,139	3.24c.

The 1926 Annual Report of the H.E.P.C., page 97, shows the number of consumers in hamlets as 39,606 and of "farms, etc." as 34,008. In Mr. Mickler's table it is stated that: "It may be observed that the number of consumers reported here do not agree with those shown in the Annual Report of the Commission. This is due to the fact that Class 2A consumers are considered as Hamlet consumers in this report and as Farm consumers in the Annual Report. Furthermore, the figures given here represent consumers actually billed, whereas the Annual Report shows the number of contracts executed to the end of each Fiscal year. In many cases service is not given until the following year."

The Commission states (p. 86 of 1936 Report) that the total rural population of the territory commonly known as "Old Ontario," largely served by the H.E.P.C., exceed 1,100,000. On the basis of four persons per family it appears that one out of every four families enjoys "Hydro" service. "The Commission estimates that within reasonable transmission distance of existing transmission lines and stations, about 65,000 farms may be served and that at the end of 1936, nearly one-half of these farms were receiving electrical service."

Public Service Directors Honor Mr. McCarter on His 70th Anniversary



DIRECTORS of Public Service Corporation of New Jersey and subsidiary operating companies gave a luncheon on October 19 in honor of the seventieth birthday anniversary of Thomas N. McCarter, president of the Public Service companies. Mr. McCarter was born October 20, 1867. The luncheon was held at the Essex Club, Newark.

In the business world, Mr. McCarter enjoys the distinction not only of being one of the founders of Public Service, organized in 1903, but of being the only president the company has ever had. In this respect Mr. McCarter is believed to occupy a unique position among the country's industries. The directors at the annual meeting last April elected him chief for the thirty-fifth consecutive time.

Also, last April, the directors by resolution waived, in Mr. McCarter's case, the provision making retirement at seventy compulsory. The sense of that resolution was that Mr. McCarter's usefulness to the company was too valuable to be dispensed with. The directors of Fidelity Union Trust Company took similar action with reference to Mr. McCarter's retirement from their board, of which he is chairman.

Mr. McCarter is well known in the utility field by reason of his identification with national associations, in which he has been active for many years. He served two terms as president of the Edison Electric Institute and is a member of its Board of Trustees. Also he has been president of the American Electric Railway Association.

As far back as 1903, Mr. McCarter, in an address before the Board of Trade in Newark, envisioned the availability of the bed of the Morris Canal for transportation purposes, and in 1924, in an address before the Newark Chamber of Commerce, Mr. McCarter presented a comprehensive union station and rapid transit plan, calling for the abandonment of the old Market Street Station, Manhattan Transfer and Park Place Station, and the erection of a new station, the accomplishment of all of which recently has been realized.

Mr. McCarter long has been an advocate of consolidation of municipalities, particularly with reference to Essex and Hudson counties.

A graduate of Princeton University, Mr. McCarter always has shown a deep interest in his alma mater. He has attended every Princeton-Yale football game since 1878, and after the fiftieth game, the Princeton University Athletic Association presented him a miniature gold football.

Mr. McCarter was elected to the State Senate in 1899 and later served as leader of the majority. In 1902 he was appointed attorney general by Governor Franklin Murphy. He also has served as chairman of the Local Government Plan Commission of New Jersey, the New Jersey School Survey Commission and the Alcoholic Beverage Commission of New Jersey, in each instance by gubernatorial appointment.

The Augustus D. Curtis Award

MESSRS. DARWIN CURTIS and Kenneth Curtis of Curtis Lighting, Incorporated, have again sponsored for the year 1938 the Curtis Award, established several years ago in memory of the late Augustus D. Curtis.

The purpose of the Augustus D. Curtis Award is to give recognition to the operating utility company within the United States, and to the individual, or individuals, in that company who contribute most to the advancement of the art of illumination as applied to the interiors or exteriors of Commercial and Public buildings. This contribution may take the form of:

A. Stimulating new and better uses of electric energy for lighting.

B. A method of lighting that is a distinct advance over present practice.

C. The development of an electric lighting service activity outstanding in its accomplishments.

D. The promotion of cooperative activities for the betterment of lighting.

E. Relighting the properties of the utility.

F. The elimination of barriers to good lighting.

The First Prize is a Certificate to the Company, and three hundred dollars to the person in that Company showing the most outstanding contribution to Commercial Electric Lighting under the terms of the Augustus D. Curtis Award. Second Prize is two hundred dollars; Third Prize one hundred dollars. It is intended that presentation of the cash awards will be made to the persons submitting the written exhibits, and then distributed to the individuals responsible for this fine achievement.

The official announcement concerning this and other awards to be administered by the Institute in 1938 appears on pages 460 and 461 of this issue.

Meeting on Underground Methods and Accessories, T and D Committee

A meeting of the Subject Committee on Underground Methods and Accessories, Transmission and Distribution Committee, E.E.I., will be held at the William Penn Hotel, Pittsburgh, Pa., on Friday, January 7, 1938. Problems having to do with materials and methods in underground operation, transmission and distribution, will be discussed. Most of the time will be taken up by a round table discussion of problems of mutual interest. The remaining time will be devoted to plans for presentation of subjects at future meetings. Interested non-members are invited.

Sags, Tensions and Characteristics of Overhead Conductors Produced in the Copper Wire Industry

By O. W. Gatchell*
Copper Wire Engineering Association

Presented at a meeting of the Transmission and Distribution Committee, E. E. I., Cleveland, Ohio, Oct. 12-13, 1937

DURING the past few years there have been many requests for uniform sag and tension charts for overhead conductors. Foremost among these requests was one initiated by the former National Electric Light Association. Several of the copper wire manufacturers, acting individually, prepared sag and tension tables. These tables left something to be desired in scope and in some cases differed slightly because of differences in basic characteristics.

To remedy this situation, the Copper Wire Engineering Association has undertaken, in co-operation with its member companies,** to establish uniform tables of conductor properties, stress-strain characteristics, and a comprehensive series of sag and tension charts. To date this work has embraced solid hard-drawn copper wire, three-strand hard-drawn copper cable and Type A Copperweld-copper conductors.

The Copper Wire Engineering Association was organized in 1936 as an engineering service organization in connection with wire products of copper, copper alloy and copper-covered steel. The basic engineering data presented with this paper, together with its development into sag and tension charts, has been prepared with the advice and unanimous approval of the Association's Committee on Overhead Construction Practices. This technical committee is composed of one engineer from each of the member companies.

In addition to the technical committee, a calculating and drafting division was established to prepare the sag and tension charts. To date about four hundred charts have been prepared covering different conductor sizes and types for the different loading districts.

*This is a condensed version of Mr. Gatchell's paper. The complete paper will be distributed with the minutes of the meeting.

**Anaconda Wire and Cable Company, Copperweld Steel Company, General Cable Corporation, Kennecott Wire and Cable Company, Phelps-Dodge Copper Products Corporation.

Types of Sag and Tension Charts and Their Uses

Four types of charts are being made, as follows:

Design Sags and Tensions (Final)
Final Sags and Tensions—Ft. Ruling Span
Initial Sags and Tensions
Stringing Sags and Tensions—Ft. Ruling Span

Each type of sag chart serves a specific purpose. The name, definition and use of each of the four types of charts are as follows:

Design Sags and Tensions (Final). See Fig. 1.
Definition: A chart for dead-end spans based on final conditions.
Use: 1. For preliminary comparison of conductors, including comparison of level ground spans for a given amount of sag or a specified clearance.
2. As an aid to the preparation of *Final* Sags and Tensions for specific ruling spans.
3. For stringing prestretched conductor in a particular dead-end span such as a river crossing span.

Final Sags and Tensions—Ft. Ruling Span. See Fig. 2.
Definition: A chart based on final conditions for a specific ruling span.
Use: 1. For locating poles or towers, which requires that clearances to ground, other lines, buildings, and other obstructions be determined in advance of line construction.
2. For preparing clearance templates for use in laying out a line on a plotted profile.
3. For stringing prestretched conductor in a series of spans between dead-end structures.

Initial Sags and Tensions. See Fig. 3.
Definition: A chart for dead-end spans based on initial conditions.
Use: 1. As an aid to the preparation of *Stringing* Sags and Tensions for specific ruling spans.
2. For stringing unstretched conductor in a particular dead-end span.

Stringing Sags and Tensions—Ft. Ruling Span. See Fig. 4.
Definition: A chart based on initial conditions for a specific ruling span.
Use: 1. For stringing unstretched conductor in a series of spans between dead-end structures.
2. For checking possible uplift at low temperatures.

It will be noted that each type of chart can be quickly identified by the use of the first word in the title. The chart numbering system completely describes the chart. For example, refer to chart numbered 2x3-H60P-400:

The first number indicates size of conductor; 2 indicates No. 2 Awg.
The first letter indicates conductor material; X indicates hard-drawn copper.
The next number indicates stranding; 3 indicates a 3-strand cable.
The next letter indicates the loading district; H indicates heavy loading.
The next number indicates the percentage of conductor breaking strength under maximum tension; 60 indicates 60 per cent of conductor breaking strength.
The last letter with or without a following span figure classifies the chart according to the four several types; the letter used also indicates the percentage of conductor strength to which the final normal tension is limited; in the example, the letter P followed by the span figure of 400 indicates that the chart is for "Stringing Sags and Tensions" in which the final normal tension is limited to 30 per cent of conductor strength for a 400-foot ruling span.

Method of Calculating the Sag Charts

The calculation of values for the sag charts is based on the catenary, using the tables prepared by Mr. James S. Martin and published in the Transactions of the Engineering Society of Western Pennsylvania, November, 1922.

A simple modification of the basic Martin method was employed for calculating initial and stringing sags and tensions. This modification consists of deducting the permanent set of the conductor from the "final" unstressed length factor (or by the use of the secant modulus) and then using an elongation factor based on the virtual initial modulus of elasticity.

In addition to Martin's tables, the following information is required for sag and tension calculations:

Basic Conductor Characteristics
Diameter
Cross-Sectional Area
Weight per foot of bare conductor
Breaking strength
Coefficient of Linear Expansion

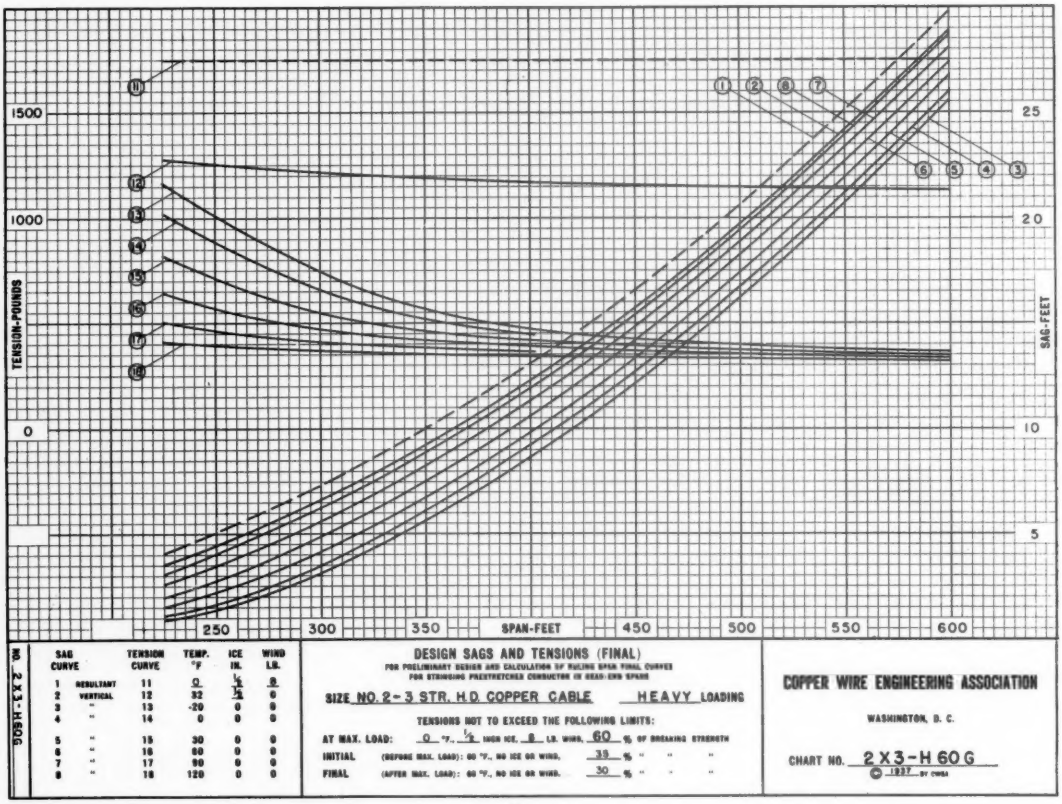

TENSION-POUNDS
1500
1000
0
SAG-FEET
25
20
10
5
250
300
350
SPAN-FEET
450
500
550
600
DESIGN SAGS AND TENSIONS (FINAL)
FOR PRELIMINARY DESIGN AND CALCULATION OF RULING SPAN FINAL CURVES FOR STRINGING PRESTRETCHED CONDUCTOR IN DEAD-END SPANS
SIZE NO. 2-3 STR. H.D. COPPER CABLE HEAVY LOADING
TENSIONS NOT TO EXCEED THE FOLLOWING LIMITS:
AT MAX. LOAD: 0 °F., 1/2 INCH ICE, 8 LB. WIND, 60 % OF BREAKING STRENGTH
INITIAL (BEFORE MAX. LOAD): 60 °F., NO ICE OR WIND, 35 % " " "
FINAL (AFTER MAX. LOAD): 60 °F., NO ICE OR WIND, 30 % " " "
COPPER WIRE ENGINEERING ASSOCIATION
WASHINGTON, D. C.
CHART NO. 2X3-H60G
© 1937 BY CWEA
NO. 2X3-H60G
SAG CURVE
TENSION CURVE
TEMP. °F
ICE IN.
WIND LB.
1 RESULTANT 11 0 1/2 8
2 VERTICAL 12 32 1/2 6
3 " 13 -20 0 0
4 " 14 0 0 0
5 " 15 30 0 0
6 " 16 60 0 0
7 " 17 90 0 0
8 " 18 120 0 0

Fig. 1

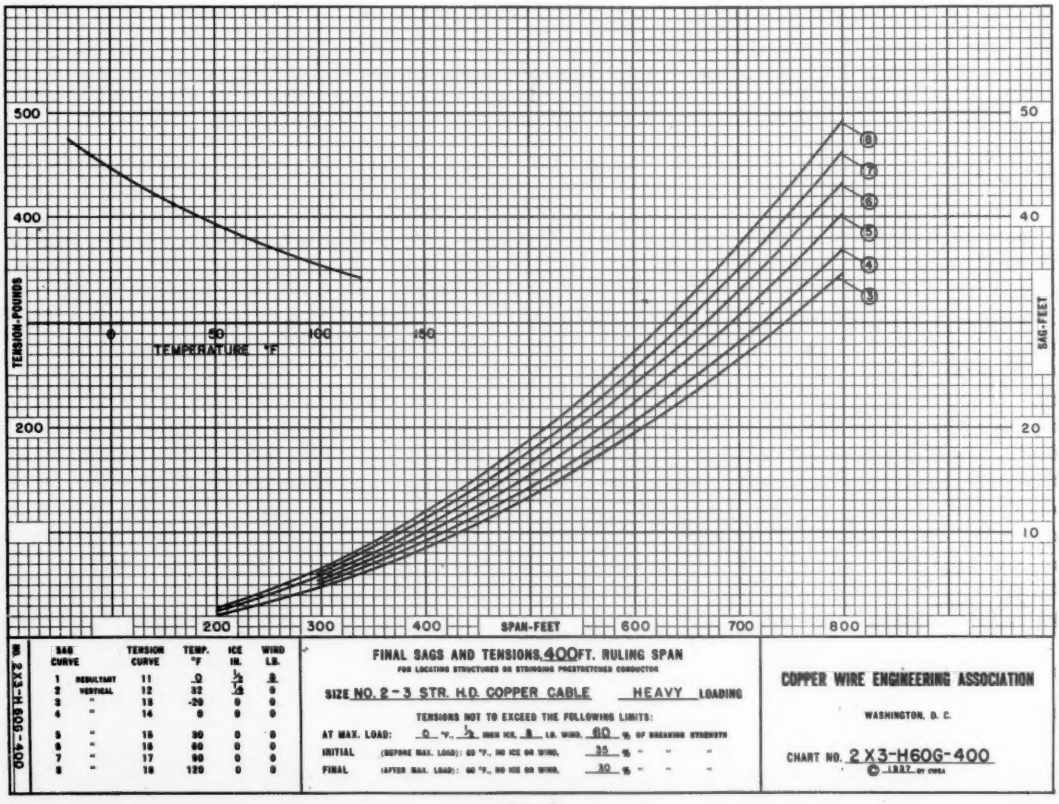

TENSION-POUNDS
500
400
200
SAG-FEET
50
40
20
10
TEMPERATURE °F
50
100
150
200
300
400
SPAN-FEET
600
700
800
FINAL SAGS AND TENSIONS 400 FT. RULING SPAN
FOR LOCATING STRUCTURES OR STRINGING PRESTRETCHED CONDUCTOR
SIZE NO. 2-3 STR. H.D. COPPER CABLE HEAVY LOADING
TENSIONS NOT TO EXCEED THE FOLLOWING LIMITS:
AT MAX. LOAD: 0 °F., 1/2 INCH ICE, 8 LB. WIND, 60 % OF BREAKING STRENGTH
INITIAL (BEFORE MAX. LOAD): 60 °F., NO ICE OR WIND, 35 % " " "
FINAL (AFTER MAX. LOAD): 60 °F., NO ICE OR WIND, 30 % " " "
COPPER WIRE ENGINEERING ASSOCIATION
WASHINGTON, D. C.
CHART NO. 2X3-H60G-400
© 1937 BY CWEA
NO. 2X3-H60G-400
SAG CURVE
TENSION CURVE
TEMP. °F
ICE IN.
WIND LB.
1 RESULTANT 11 0 1/2 8
2 VERTICAL 12 32 1/2 0
3 " 13 -20 0 0
4 " 14 0 0 0
5 " 15 30 0 0
6 " 16 60 0 0
7 " 17 90 0 0
8 " 18 120 0 0

Fig. 2

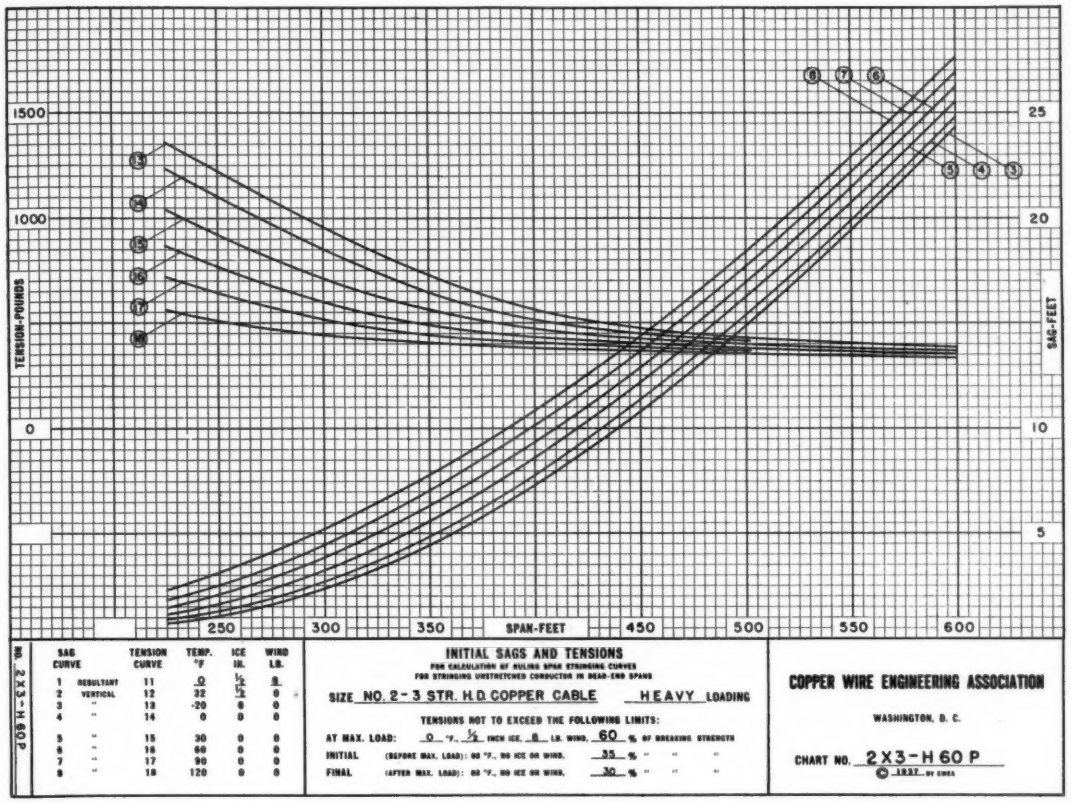

1500
1000
0
TENSION-POUNDS
25
20
10
5
SAG-FEET
250
300
350
SPAN-FEET
450
500
550
600
INITIAL SAGS AND TENSIONS
FOR CALCULATION OF RULING SPAN STRINGING CURVES
FOR STRINGING UNSTRETCHED CONDUCTOR IN DEAD-END SPANS
SIZE NO. 2-3 STR. H.D. COPPER CABLE HEAVY LOADING
TENSIONS NOT TO EXCEED THE FOLLOWING LIMITS:
AT MAX. LOAD: 0 °F., ½ INCH ICE, 8 LB. WIND, 60 % OF BREAKING STRENGTH
INITIAL (BEFORE MAX. LOAD): 60 °F., NO ICE OR WIND, 35 % " " "
FINAL (AFTER MAX. LOAD): 60 °F., NO ICE OR WIND, 30 % " " "
SAG CURVE
TENSION CURVE
TEMP. °F
ICE IN.
WIND LB.
1 RESULTANT 11 0 ½ 8
2 VERTICAL 12 32 ½ 0
3 " 13 -20 0 0
4 " 14 0 0 0
5 " 15 30 0 0
6 " 16 60 0 0
7 " 17 90 0 0
8 " 18 120 0 0
COPPER WIRE ENGINEERING ASSOCIATION
WASHINGTON, D. C.
CHART NO. 2X3-H60P
© 1937 BY EWEA
No. 2X3-H60P

Fig. 3

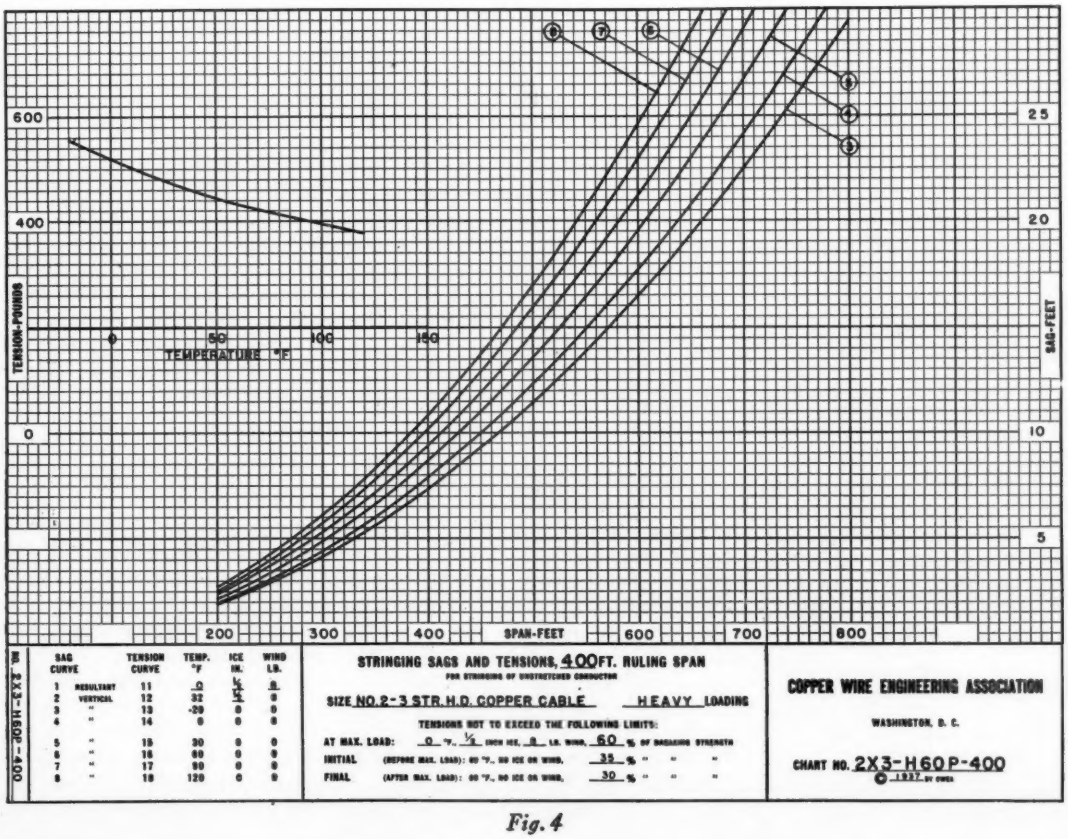

600
400
0
TENSION-POUNDS
TEMPERATURE °F
50
100
150
25
20
10
5
SAG-FEET
200
300
400
SPAN-FEET
600
700
800
STRINGING SAGS AND TENSIONS, 400 FT. RULING SPAN
FOR STRINGING OF UNSTRETCHED CONDUCTOR
SIZE NO. 2-3 STR. H.D. COPPER CABLE HEAVY LOADING
TENSIONS NOT TO EXCEED THE FOLLOWING LIMITS:
AT MAX. LOAD: 0 °F., ½ INCH ICE, 8 LB. WIND, 60 % OF BREAKING STRENGTH
INITIAL (BEFORE MAX. LOAD): 60 °F., NO ICE OR WIND, 35 % " " "
FINAL (AFTER MAX. LOAD): 60 °F., NO ICE OR WIND, 30 % " " "
SAG CURVE
TENSION CURVE
TEMP. °F
ICE IN.
WIND LB.
1 RESULTANT 11 0 ½ 8
2 VERTICAL 12 32 ½ 0
3 " 13 -20 0 0
4 " 14 0 0 0
5 " 15 30 0 0
6 " 16 60 0 0
7 " 17 90 0 0
8 " 18 120 0 0
COPPER WIRE ENGINEERING ASSOCIATION
WASHINGTON, D. C.
CHART NO. 2X3-H60P-400
© 1937 BY EWEA
No. 2X3-H60P-400

Fig. 4

Stress-Strain Characteristics
- Final Modulus of Elasticity
- Permanent Set or secant modulus
- Virtual Initial Modulus of Elasticity

The Assumed Loading Condition
- Weight per foot of conductor with the selected ice and wind loading

Limitation of Conductor Tensions
- Maximum tension as governed by regulatory rules
- The initial normal tension
- The final normal tension

Basic Conductor Characteristics

In order to eliminate minor differences in previously published tables, new conductor tables were computed, based upon standards that have been investigated and accepted by the Association's Committee on Overhead Construction Practices.

The wire diameter was computed from the fundamentals of the American Wire Gauge given in the U. S. Bureau of Standards Circular No. 31.

The basic figure for size of stranded cable was taken as the circular mil area of the corresponding Awg. size of wire.

The density of copper was taken as 8.89 grams per cubic centimeter at 20°C, as established by the International Electrotechnical Commission and published as Appendix V of the Bureau of Standards Circular No. 31. The density of copperweld was determined as 8.15 grams per cubic centimeter at 20°C. The weight of stranded cable was based upon the following adjustments for stranding:

Stranded Conductor	Percentage of Increase
Seven-strand hard-drawn copper cable	2.0
Three-strand copper cable	1.0
Type A Copperweld-copper conductor	0.8

The specifications for Type A conductors provide for a longer pitch than three wire copper cable, and therefore have a smaller weight increment.

The breaking strength for hard-drawn copper wire was based upon the tensile strength given in American Standards Association Approved Standard H14-1929; for copperweld wire, the breaking strength is based upon Copperweld Wire Specifications BW-35. The breaking strength of cable was based upon the strength of the individual wires including the following adjustment for stranding:

Stranded Conductor	Percentage of Sum of Breaking Strengths of Individual Wires
Hard-drawn copper cable	90
Type A Copperweld-copper Conductor	
Sizes 2A to 6A inclusive	95
Sizes 7A and 8A	93

These percentages are based on established manufacturing practices. The higher percentages for Type A conductors are again due to difference in pitch.

In calculating the basic conductor characteristics all values were rounded in the sixth significant figure. When the calculations were completed, the tabulated values were rounded in the fourth significant figure, with the exception of cable diameter which was rounded in the third significant figure.

The coefficient of linear expansion for copper varies somewhat with different investigators and also with respect to the reference temperature. The value adopted is 0.0000094 per degree Fahrenheit. This is an average of several determinations and is reported in U. S. Bureau of Standards Scientific Paper No. 410. The coefficient of linear expansion for Type A Copperweld-copper conductor was determined by the Association's technical committee, as follows:

Sizes	Coefficient of Linear Expansion per Degree Fahrenheit
2A to 6A inclusive	.0000085
7A and 8A	.0000081

Stress-Strain Characteristics

Calculated sags and tensions must agree with the performance of the conductor in use. On the overhead line, the direct stress on the conductor changes with the change in weather loading. In the testing laboratory the total elongation curve and the final modulus of elasticity are determined from stress-strain tests of the conductor material. From these characteristics the permanent set or secant modulus and the virtual initial modulus of elasticity are determined. These characteristics are required in the determination of initial and final sags and tensions which in turn show the performance of the conductor in service.

More than one hundred stress-strain tests accumulated over several years by the member companies were reviewed by the Association's technical committee and were found to show a rather wide range in these characteristics. A canvass of the literature of the subject indicated a still wider range. The characteristics are in some measure dependent upon the rate of testing, the total stress applied, and the time each successive load is held. In addition, variations in the nature and treatment of the test samples, and in the testing equipment and personnel must also be considered; although there was some divergence in individual tests, a majority of the tests indicated a median value for final modulus of elasticity for hard-drawn copper conductors of 17,000,000 lb. per sq. in.

In order to study the matter further a new series of tests under carefully controlled conditions was undertaken to check this value. The test procedure was agreed upon as representative and was followed by the member companies' testing laboratories. In applying the test loads, the procedure was arranged to correspond closely to overhead line conditions rather than to apply a heavy load for a very long period of time.

Solid Hard-drawn Copper Wire

Ten stress-strain check tests were made by the member companies. All ten tests were plotted and in each case the line marking the final modulus of elasticity showed a slight curvature. In order to refine the measurement of the slope of these lines, it was agreed by the committee to determine the final modulus as the slope of a straight line passing through the curve at stresses of 10,000 and 35,000 lb. per sq. in. These stresses mark the usual working range of hard-drawn copper wire on overhead lines.

The following tabulation summarizes the results obtained for final modulus of elasticity:

Stress-Strain Tests on Solid Hard-drawn Copper Wire	Final Modulus of Elasticity Lb. per Sq. In.
Highest value	19,300,000
Lowest value	16,200,000
Average of 10 values	17,370,000
Median value	17,150,000
Adopted value	17,000,000

On the basis of these test results a final modulus of elasticity of 17,000,000 lb. per sq. in. for hard-drawn copper wire has been adopted by the Copper Wire Engineering Association.

It is interesting to note that a difference of 1,000,000 in the final modulus of elasticity would result in a difference in final sag of only 3% in an extreme instance. In most cases this difference affects sag much less than 3%.

In all of the ten tests the total elongation at 45,000 lb. per sq. in. was of the same order of magnitude, ranging from a minimum of 0.00293 to a maximum of 0.00395 inches per inch. Five of the tests included a large number of readings, nearly all of which plotted on a smooth curve, thus indicating a high degree of consistency among these values. Using the five tests as a basis, tabulation of total elongation is compiled in Table I.

From the average values, a total elon-

gation curve was drawn. The stress-strain diagram was closed by drawing in the line marking the final modulus; the slope of this line corresponds to a value of 17,000,000 lb. per sq. in. The permanent set was then measured as the distance between the total elongation curve and a line drawn through the origin parallel to the final modulus.

The total elongation curve plotted from the above values is changing slope at all points on the curve. Nevertheless, it is entirely possible, by the use of a second modification of Martin's method, to return exactly to the curve in calculating conductor performance. However, the use of a straight line initial modulus of elasticity facilitates the mathematical calculation of initial sags and tensions. By selecting this "virtual" initial modulus so that its slope parallels the tangent to that portion of the curve corresponding to the stringing tension in the wire, the error is negligible and is less than can be expected from variations in the total elongation curve obtained from different samples of wire. On this basis a virtual initial modulus of 14,500,000 lb. per sq. in. has been adopted by the Copper Wire Engineering Association for solid hard-drawn copper wire for purposes of sag and tension calculations.

Three-Strand Hard-drawn Copper Cable

Nine check tests on three-strand hard-drawn copper cable were made by the member companies. The final modulus of elasticity was determined for each test in the same manner as for solid wire and the results are summarized in the following tabulation:

Stress-Strain Tests on 3-Strand H. D. Copper Cable	Final Modulus of Elasticity Lb. per Sq. In.
Highest value	18,500,000
Lowest value	16,700,000
Average of 9 values	17,420,000
Median value	17,160,000
Adopted value	17,000,000

Using the nine tests as a basis, tabulation of total elongation is compiled in Table II.

From the average values a total elongation curve was drawn. The resulting permanent set and virtual initial modulus were then derived in the same manner as for copper wire. A virtual initial modulus of 14,000,000 lb. per sq. in. has been adopted by the Association for three-strand hard-drawn copper cable for sag and tension calculation purposes.

Type A Copperweld-Copper Conductors

Type A Copperweld-copper conductors are composed of two hard-drawn copper wires and one extra high strength copperweld wire. In sizes 2A to 6A all three wires have the same diameter. In sizes 7A and 8A the two copper wires are so proportioned that their total cross-sectional area equals that of the one copperweld wire. Because of the different proportions of material in the two groups of sizes, separate stress-strain diagrams are required for each group.

Individual stress-strain tests can show considerable variation due to small differences in test specimens, differences in testing procedure and the limitations in precision of tests. In order to minimize the effect of these variations in individual tests, the following procedure was used in developing the stress-strain diagrams for Type A conductor. A series of about 70 tests were used to determine the average total elongation at 60% of conductor breaking strength. These values were 0.00433 and 0.00447 inches per inch for sizes 2A to 6A and sizes 7A and 8A respectively. The total elongation curve was then drawn through these values, conforming to the general shape of individual stress-strain curves. The final modulus of elasticity for each group of sizes was adopted from the average of several test values. The stress-strain diagrams were then checked by superimposing the plotted results of six individual tests made by the member companies. All of the six tests conformed closely with the diagrams.

Permanent set and virtual initial modulus were then derived in the same manner as for hard-drawn copper.

Values for the modulus of elasticity for Type A conductor which have been adopted by the Copper Wire Engineering Association are summarized in Table III.

TABLE I

Test	Conductor Size Awg.	Elongation in Inches, per Inch at the Following Stresses in Lb. per Sq. In. 5,000	15,000	25,000	35,000	45,000
A—1	6	.....	.000684	.001463	.002382	.003565
A—2	4	.....	.000635	.001465	.002517	.003914
B—1	4	.....	.000654	.001405	.002384	.003437
B—2	4	.....	.000666	.001418	.002279	.003461
B—3	4	.....	.000700	.001468	.002359	.003529
Average of 5 Tests (Average values corrected for zero stress and elongation by adding 0.000320)		..... .000320	.000668 .000988	.001444 .001764	.002384 .002704	.003581 .003901

TABLE II

Test	Conductor Size Awg.	Elongation in Inches per Inch at the Following Stresses in Lb. per Sq. In. 5,000	15,000	25,000	35,000	45,000
A—1	2-3	.....	.000770	.001568	.002488	.003645
B—1	2-3	.....	.000750	.001548	.002464	.003661
B—2	2-3	.....	.000722	.001514	.002422	.003605
B—3	2-3	.....	.000715	.001502	.002361	.003479
B—1	4-3	.....	.000660	.001387	.002190	.003298
B—2	4-3	.....	.000659	.001364	.002192	.003298
B—3	4-3	.....	.000705	.001435	.002286	.003414
C—1	2-3	.....	.000625	.001350	.002200	.003370
C—2	2-3	.....	.000625	.001340	.002183	.003330
Average of 9 Tests (Average values corrected for zero stress and elongation by adding 0.000351)		..... .000351	.000692 .001043	.001445 .001796	.002310 .002661	.003456 .003807

TABLE III

Modulus of Elasticity Lb. per Sq. In.	2A to 6A Conductors	7A and 8A Conductors
Final	19,000,000	21,000,000
Virtual initial	16,500,000	18,500,000

Summary of Modulus Values

Conductor	Modulus of Elasticity Lb. per Sq. In. Virtual Initial	Final
Solid Copper, hard-drawn	14,500,000	17,000,000
Three-Strand Copper Cable, hard-drawn	14,000,000	17,000,000
Type A Copperweld-copper		
Sizes 2A to 6A inclusive	16,500,000	19,000,000
Sizes 7A and 8A	18,500,000	21,000,000

Limitation of Conductor Tensions

The National Electrical Safety Code permits maximum conductor tensions under heavy, medium or light loading conditions of 50% of the rated strength of the conductor for Grades A and B construction and 60% for Grade C construction. The use of these maximum tensions will in some instances result in a "final normal" conductor tension in excess of that considered suitable for usual operations. For example, in light loading districts if the maximum tension of 60% of the rated strength of the conductor is applied, the normal tension may be of the order of 50% or higher.

By final normal tension is meant the tension at 60° F. without wind, after permanent elongation has taken place. This condition has been selected as representative of prevailing conditions during the greater part of the life of the line.

A realization of this condition has led to the selection of additional governing tensions more conservative than those resulting for final normal conditions under the National Electrical Safety Code. Different methods of obtaining the desired result have been proposed, but it was finally decided that a direct approach to the problem was the best. Consequently, normal tension limitations of 25% for solid and 7-wire, and 30% for 3-wire copper cable have been used. The higher limitation for the 3-wire copper cable has been used in recognition of its irregular surface and resulting better performance characteristics.

With copper conductors these final normal tension limits will apply approximately as follows:

Heavy Loading—Large conductors only in all usual ruling spans.

Medium Loading—Large conductors in all ruling spans; small conductors in short ruling spans.

Light Loading—All conductors in all usual ruling spans.

In the case of Type A Copperweld-copper conductors it has been customary since the introduction of this type of conductor to limit final normal tensions to 25% of the rated strength of the conductor and where this limitation applies it has been used in the calculation of the charts.

In addition to the final normal tension, consideration has also been given to the initial normal or stringing tensions, which apply for only short periods of time. The initial normal tension as

SALES—ELECTRIC REFRIGERATORS

(Household Models Only)

MONTH OF SEPTEMBER AND FIRST NINE MONTHS OF 1937-1936

	Month of September 1937	Month of September 1936	Month of August 1937	First Nine Months 1937	First Nine Months 1936
Total United States	82,688	80,050	120,543	2,101,887	1,833,682
Maine	183	71	643	7,966	6,978
New Hampshire	284	267	417	6,360	5,970
Vermont	(2)	(74)	283	5,122	4,286
Massachusetts	3,976	3,594	6,048	84,502	71,325
Rhode Island	616	386	721	11,276	9,139
Connecticut	1,569	807	2,048	37,535	31,070
Total New England	6,626	5,051	10,160	152,761	128,768
New York	15,095	17,501	23,412	244,322	210,162
New Jersey	4,173	4,712	4,609	83,772	77,848
Pennsylvania	7,715	8,807	11,309	205,405	168,782
Total Middle Atlantic	26,983	31,020	39,330	533,499	456,792
Ohio	7,000	5,354	7,691	154,061	120,497
Indiana	1,513	1,567	3,050	59,461	52,013
Illinois	4,992	3,274	7,269	162,765	134,840
Michigan	2,933	3,706	6,547	111,749	90,305
Wisconsin	506	654	2,491	44,024	30,834
Total East No. Central	16,944	14,555	27,048	532,060	428,489
Minnesota	3,462	608	1,314	37,939	25,468
Iowa	981	529	663	31,574	28,227
Missouri	2,110	2,269	2,485	60,972	58,538
North Dakota	146	59	108	3,587	2,918
South Dakota	61	(62)	155	4,354	4,754
Nebraska	589	176	495	15,312	16,158
Kansas	(67)	789	767	23,005	21,792
Total West No. Central	7,282	4,368	5,987	176,743	157,855
Delaware	437	19	334	4,846	3,551
Maryland	1,229	907	1,867	26,356	20,078
District of Columbia	1,243	1,104	1,501	17,018	17,739
Virginia	1,313	1,203	1,258	32,677	29,145
West Virginia	180	193	848	25,054	23,167
North Carolina	1,101	554	795	44,177	35,265
South Carolina	394	260	700	21,247	17,148
Georgia	513	585	912	36,295	30,705
Florida	1,687	3,543	2,390	25,268	24,829
Total South Atlantic	8,097	8,368	10,605	232,938	201,627
Kentucky	1,235	257	1,026	28,119	24,667
Tennessee	1,316	1,277	1,455	33,882	28,229
Alabama	1,120	802	790	23,382	20,867
Mississippi	(285)	290	561	10,907	10,589
Total East So. Central	3,386	2,626	3,832	96,290	84,352
Arkansas	105	298	451	11,680	10,871
Louisiana	1,242	1,144	1,264	21,874	18,668
Oklahoma	462	630	1,255	21,246	18,667
Texas	2,906	2,881	5,905	83,836	75,590
Total West So. Central	4,715	4,953	8,875	138,636	123,796
Montana	48	260	281	8,078	8,708
Idaho	502	231	433	8,871	8,912
Wyoming	27	51	110	2,904	2,833
Colorado	229	662	680	13,784	13,602
New Mexico	83	135	165	4,337	3,667
Arizona	611	129	346	7,258	5,773
Utah	157	400	959	11,341	11,048
Nevada	15	182	100	2,367	2,667
Total Mountain	1,672	2,050	3,074	58,940	57,210
Washington	982	1,071	2,392	31,106	30,716
Oregon	498	500	1,041	16,102	19,362
California	5,503	5,488	8,199	132,812	144,715
Total Pacific	6,983	7,059	11,632	180,020	194,793

Figures based on report by the NEMA on Net Sales to Dealers and Jobbers.

the term is used here is the tension in the conductor at 60° F. without wind loading before permanent elongation has taken place. It is effective, of course, only in the case of unstretched conductors—never if the conductor has been prestretched.

In the case of Type A Copperweld-copper it has been usual to limit the initial normal tension to 35% of the rated strength of the conductor. While this same limitation has been shown on the sag and tension charts for hard-drawn copper conductors the limitation is not reached except in a few isolated cases.

It will be recognized, of course, where part or all of a chart is based on limited tension at 60% F., that the corresponding tension at maximum load is less than that permitted by the National Electrical Safety Code. The 60° F. tension limitations, in percentage of conductor breaking strength, which have been applied on the Association's sag charts presented with this paper are summarized as follows, and have been used on charts for all loading districts and grades of constructions:

Initial tension at 60 deg. Fahr. before Max. load, all conductors	35%
Final tension at 60 deg. Fahr. after Max. load; three-strand hard-drawn copper cable	30%
Solid hard-drawn copper wire and Type A Copperweld-copper conductor	25%

Conclusion

It is not practical to include with this paper all of the detailed test records and information developed by the investigations of the Association's Committee on Overhead Construction Practices. These records are available for inspection. The Association, through its technical committee, will welcome the opportunity to meet with any interested group for a detail discussion of the material.

Individual sag and tension charts, in addition to wire tables and loading tables, are available from Copper Wire Engineering Association, Union Trust Building, Washington, D. C. Requests for sag and tension charts should identify the particular size of conductor and the NESC grade of construction and loading district.

" . . . I fear the 'intellectuals,' the sentimentalists, and the uplifters—to me they are all one—even as I do the politicians and the profiteers. If only, instead of heaping up evils, they could but neutralize each other, like alkali and acid."—*Dr. L. J. Henderson in Harvard Business Review.*

RECENT PUBLICATIONS

CHARACTERISTICS OF POWER SYSTEM FAULTS TO GROUND

E.E.I. Pub. E-9. Engineering Report No. 39 of the Joint Subcommittee on Development and Research, Edison Electric Institute and Bell Telephone System, 37 pages. Price 60¢ to members and their employees; $1.50 to non-members in the U. S. A.; $1.60 to foreign countries.

RESULTS are given of studies to determine the characteristics of power system faults to ground. The results include (1) the determination of representative values of fault resistance, as bearing most directly on inductive coordination, and (2) causes of ground current disturbances, their frequency of occurrence, monthly distribution, duration, method of clearance and wave trace characteristics.

OIL AND GAS ENGINES—1936-1937

E.E.I. Pub. E-15. A report of the Oil and Gas Subcommittee of the Prime Movers Committee, Edison Electric Institute, 14 pages. Price 40¢ to members and their employees; $1.00 to non-members in the U. S. A.; $1.10 to foreign countries.

This report contains statements on:

Recent Diesel-Engine Production and Development: Progress in United States and foreign countries; new installations.

Operating and Maintenance Problems: Installation problems; parallel and automatic operation; high-speed engine service.

Engine Regulation and Voltage Control: Speed changes; cyclic irregularity; governors; flywheel effect; angular deviation; resonance.

Demand-Capacity Relationship.

Diesel-Plant Auxiliary Equipment: New fuel pump; superchargers.

Convertible Gas-Oil Engine: Engine specifications; price data; material for conversion.

Engine Prices: Cost data for small Diesels and gas engines; price trends.

Plant Investment-Cost Data: Installed cost of Diesel-generating plants; automatic plants.

Plant Operating Data: covering 73 engine units; maintenance costs; operating factors and outages.

Manufacturers' Statements.

PRINCIPLES OF PUBLIC UTILITY DEPRECIATION

By Perry Mason, Professor of accounting, Antioch College. Published as the first of a series of monographs on accounting principles by the American Accounting Association, 6525 Sheridan Road, Chicago. 128pp. $1.

THIS publication is a worthy and scholarly compilation of opinions and ideas on the subject of public utility depreciation, but it appears to suffer somewhat from a fundamentally erroneous conception that the principal objective of depreciation accounting is to accumulate a reserve fully equal to the retirement loss on property at the time when it is retired from service and to distribute the total depreciation by a systematic and applicable plan over the accounting periods within the life of the property. Also, that the reserve developed in accordance with these principles which are believed to be erroneous can be deducted from cost or a proportionate deduction may be made from the reproduction costs as a measure of loss in value due to depreciation.

Thus, the author says (page 16) "The important thing is to make sure that the total amount to be allocated to operations is all absorbed over the useful life of the asset in some systematic, conservative manner."

Further, he says (page 71) "The only essential requirements are that the property be fully depreciated when it is ready to be retired from service and that some reasonably equitable plan be used to distribute the total depreciation of an asset over the period of its life."

On page 96 he says "The simplest and, in the long run at least, as equitable a procedure as any, is the use of depreciated original cost as a rate base, the deduction being equal to the accumulated reserve for depreciation.—If reproduction cost is used in valuing the property of the utility, there is little likelihood that the amount of the depreciation reserve will be the appropriate amount to deduct, but it does seem reasonable that the deduction should be in proportion to the existing reserve, i.e., if a reserve has been accumulated equal to 25 per cent of the original cost, then 25 per cent of the reproduction cost should be deducted in arriving at the rate base."

On page 103, in his statement of conclusions, he says "Use original cost less the amount in the depreciation reserve as the rate base whenever this is possible.—If reproduction cost new must be used, adjust the depreciation reserve to correspond to the proportion of reproduction cost to original cost, and deduct it from the reproduction cost to get the rate base."

These comments appear to be contrary to some of the present trends in public utility regulation and decision which emphasize that depreciation in accounting and in valuation shall reflect the loss in value that actually occurs. This exactly reverses the emphasis and requires that the charge to expense in each period must be the loss in value that occurs in that period, and that a program of accounting shall be adopted which will result in reserves which reflect the pro-

(*Continued on page* 479)

PUBLICATIONS OF THE INSTITUTE

Pub. No.		Date Issued	Price to Members	Price to Non-Members	Price to Foreign Countries
E1	Rectifier Wave Shape	(4/37)	$0.40	$1.00	$1.10
E2	The Electric Light and Power Industry in 1936	(1/37)	.30	.75	.85
E3	Jointly Used Wood Pole Lines Specifications	(1/37)	.50	1.50	1.60
E4	Joint Use of Poles, 6.6 and 13.2 kv, Safety Features	(1/37)	.30	.75	.85
E5	Principles and Practices for Inductive Coordination, A.A.R. and E.E.I.	(1/37)	n. c.	n. c.	n. c.
E8	A.C. Network Operation—1934-1935	(6/37)	.70	1.60	1.75
E9	Characteristics of Power System Faults to Ground—Engineering Report No. 39 of the Joint Subcommittee on Development and Research	(11/37)	.60	1.50	1.60
E10	Power Station Chemistry—1937	(9/37)	.30	.75	.85
E11	Combustion—1937	(9/39)	.80	2.00	2.15
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E15	Oil and Gas Engines—1936-1937	(10/37)	.40	1.00	1.10
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TD51	Suggestions for Specifications for Low and Medium Voltage Pin Type Insulators	(5/37)	.10	.10	.10
TD71	Suggestions for Specifications for Insulator and Pin Threads and Gauges	(5/37)	.10	.10	.10
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D7	Combustion, 1936	(10/36)	.60	1.50	1.60
D8	Superposition of High Pressure Non-Condensing Equipment on Existing Power Stations	(10/36)	.25	.65	.75
D9	Principles and Practice in Grounding	(10/36)	.40	1.00	1.10
D10	Oil and Gas Engines—1935-1936	(10/36)	.40	1.00	1.10
D11	Turbines, Condensers, Feedwater Heaters and Pumps—1936	(11/36)	.60	1.50	1.60
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D13	Engineering Reports of the Joint Subcommittee on Development and Research—Vol. III	(1/37)	5.00	10.00	10.00
D14	Engineering Reports of the Joint Subcommittee on Development and Research—Vol. IV	(1/37)	5.00	10.00	10.00
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D17	Cable Operation—1935	(12/36)	.60	1.50	1.60
C4	Boilers, Economizers, Air Heaters and Piping—1935	(7/35)	.60	1.50	1.60
C5	Turbines, Condensers and Feedwater Heaters—1935	(7/35)	.40	1.00	1.10
C6	Combustion—1935	(8/35)	.80	2.00	2.15
C7	Air Conditioning—1935	(9/35)	.50	1.25	1.35
C8	Oil and Gas Engines—1934-1935	(10/35)	.50	1.25	1.35
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C14	Resuscitation Charts	(4/36)	1-10 copies .10 each 11-100 copies .05 each 101-1000 copies .04 each 1001 or more .03 each		
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B3	Condensers, Feedwater Heaters, Evaporators, and Boiler Feed Pumps—1934	(6/34)	.45	1.15	1.25
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B7	Oil and Gas Engines	(8/34)	.40	1.00	1.10
B8	Steam Generation	(8/34)	.60	1.50	1.60
B9	The Electric Light and Power Industry in 1933	(10/34)	.30	.75	.85
B10	Electrical Energy Diversion	(10/34)	.20	.50	.55
B11	Cable Operation—1933	(12/34)	.60	1.50	1.60
B12	A-C Network Operation—1932-1933	(12/34)	.40	1.00	1.10

List of earlier publications will be sent upon request.

The prices include mailing charges. Member prices apply to employees of company members of the Institute. Please send money order or check with order. Orders should be addressed to—

EDISON ELECTRIC INSTITUTE 420 Lexington Avenue, New York, N. Y.

POWER SALES ITEMS

Power Sales Items have appeared on this page regularly since 1933. While it has been felt that these items, consisting of references from the current technical press, were performing an important service to power salesmen there has been some doubt as to whether they were meeting the requirements of those they were designed to serve.

We will appreciate your comments on the desirability of continuing the Power Sales Item section.

Engineering and Accounting Economics

(*Continued from page* 453)

lem of establishing continuing property records. I hasten to assure you that I am not going to advocate large units or small units of property, nor any particular method of accounting for reconstruction costs. These matters have been and will be debated at length by experts. While this is necessary, I believe it is of secondary importance. I submit that the more important consideration is that we arrive ultimately at rules and procedures and interpretations thereof which shall be uniform throughout the country.

I said before that I felt these new requirements would have many advantages in connection with the normal operations of the individual companies. These advantages can be extended as between companies only if we all talk the same language. Engineers frequently try to find out how certain of the designs or operations of one company compare with those of other companies. There are already enough variables to make these comparisons difficult. It would be helpful to have the number of variables reduced and a uniform system of accounts and uniform interpretations thereof will make a very substantial contribution to that end.

For example, if I want to compare operating costs of one of our generating stations with a generating station of another company, I must proceed laboriously to take apart the production costs as reflected in the accounts. The accounts don't break down the total dollars in as many pieces as I would like and I am not suggesting that they should. I am suggesting that it would be helpful if I could be sure that the same elements, and no others, entered into those dollars.

In making such comparisons, it is bad enough to have to figure out differences due to different labor rates, different numbers of employees made necessary by differences in design or different operating practices or policies, variations in the price of fuel and other operating supplies, and all the other things over which there can be no engineering or accounting control.

Why add to the possibilities of introducing different elements into the recorded production costs of a generating station by lack of uniformity in the selection of retirement units? If one company selects a turbo-generator as a retirement unit and another company breaks this down into a number of retirement units; such as, the rotor of the generator, the spindle of the turbine, the generator winding, the generator frame, the turbine casing and the bed plates, there will be a vast difference in the amount charged to the expense accounts for normal maintenance and repairs. If a similar divergence of practice exists with respect to most of the items of property in a generating station, it will be practically impossible to make any direct comparison of operating costs without a tremendous amount of labor.

In setting up new rules for the accounting game, why not have uniform rules and uniform iterpretations of these rules, so that we can be sure that the same kind, and only the same kind, of things are charged in the various accounts. I am not asking for immediate uniformity of rules, but I am suggesting that our efforts should be toward that end; that there should be a continuous exchange of experience and points of view, and that we should expedite, as rapidly as possible, a common understanding and a common treatment of these matters.

In my opinion, we are ultimately going to be required to do this whether we like it or not. I believe that the underlying philosophy of these Commission requirements is to enable regulatory bodies to make comparisons—the same kind of comparisons we want to make. If we face this situation squarely and do our best to bring about a workable plan and succeed in bringing it about, we shall certainly be better off than we would be under some uniform plan, not very logically conceived but arbitrarily forced upon us.

About five minutes after I have finished a talk, I begin to think of better arguments that might have been used; better examples that might have been cited and more important points that might have been stressed. I am perfectly well aware that my listeners also have been wondering why I spent so much time on certain items and missed other more important ones. Any number of you could probably point out a lot of things which would accomplish more substantial economies than anything I have suggested. I hope that is the case—that is as it should be. If I have succeeded in doing this, I believe that the purpose of my being asked to address you will have been accomplished.

Recent Publications

(*Continued from page* 477)

portionate loss in value due to the causes of depreciation.

It is interesting to note the author's use of the term "Original Cost" with the customary assumption that most authors have that this term is wholly understood. Extensive researches indicate that this term is casually used with little understanding of its true meaning. —*B. S. Rodey, Jr.*

Return on Investment

(*Continued from page* 442)

is being drawn on heavily by the Government in the form of taxes to be dissipated largely in unproductive ways, and the former (saved-up human labor) will not continue to be saved unless the saver can feel secure in getting a return on his thrift and industry. A thoughtless government can, if it will, quickly skim off the cream represented by the self-denial of its citizens, but the process, so far as safeguarding future supplies of capital is concerned, is like killing the goose that lays the golden eggs. The whole history of capital is its continual destruction in use and unless fresh supplies are constantly forthcoming from the thrift of the people, general stagnation and decay sets in. It would be most dangerous, therefore, for a State to destroy the main incentive to thrift which arises from the expectation of getting a fair return upon its results.

From the viewpoint of the general welfare, the amounts paid for a return on capital are just as effective in promoting business enterprise as the amounts paid for labor or materials. Each equally goes to help support commerce and maintain employment and the amount paid for return on investment is even more likely than that paid for labor and materials to become available for financing further enterprises upon which progress and economic welfare depend.

Going back to the breakdown of cost of utility service referred to at the beginning, we see the reason why the so-called Government "yardstick" should in all cases be so carefully scrutinized. For if, as is usually the case, practically no taxes are paid by a Government project, and in addition most of the capital costs are by the Government charged to navigation or flood control, or irrigation or anything else but electric power, it becomes clear why apparently astoundingly cheap electricity can be produced by Government plants. It is done by forcibly eliminating or cutting down the very factors which actually contribute 5/8 of the cost of producing electricity, in which case the remaining 3/8, representing only operating and maintenance cost, naturally seems very low. Private companies could do even better with corresponding subsidies.

It should be remembered, however, that merely because these costs are disregarded or buried in the bookkeeping methods employed, it does not mean that they are not paid in other ways. They are still there, represented by higher total taxes, but the politicians, ostrich-like, believe that if you can't see them they don't exist. While these bookkeeping methods may at first blush appear to accomplish with a stroke of the pen the elimination of the lion's share of the cost of electricity (if the Government does it), further thought will indicate that not only do the costs go on but that the taxpayer pays them. Interest on the public debt now exceeds the total annual budget of the Federal Government for any year of its existence prior to 1917. Still further reflection leads to the conclusion that, due to the excessively large capital requirements inherent in the electric utility service, there is probably no other form of taking money from the taxpayers to help the consumer which will show such a poor return as electricity. A much larger net saving to the consumer per dollar of tax money could be made on the aggregate of items of comparable size in the consumer's budget in which capital cost does not loom so large. Based on the U. S. Department of Commerce "Statistical Abstract of the United States," pp. 738 et. seq., the amount paid by the people in 1927 (based on *manufacturing* cost) for ice cream, candy, soft drinks, cigarettes, soap, cosmetics, chewing gum and patent medicines was $2,500,000,000, or about three and a half times as much as the total present *retail* cost of electricity in the home. A rise of 10 per cent in the present budget of the Federal Government, as has been forecast, will amount to more than the total bill of the farms and homes of this country for electric service.

CONVENTIONS AND MEETINGS

NOVEMBER

5 Sales Committee, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

8-10 Accounting Committee Conclave, Book Cadillac Hotel, Detroit, Mich.

11-13 Wisconsin Utilities Association, Electric Section, Commercial and Technical Divisions, Pfister Hotel, Milwaukee, Wis.

DECEMBER

6-7 Prime Movers Committee, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

6-10 American Society of Mechanical Engineers, New York, N. Y.

JANUARY

19-21 American Society of Civil Engineers, New York, N. Y.

24-26 National Warm Air Heating and Air Conditioning Association, New York, N. Y.

24-28 American Institute of Electrical Engineers, New York, N. Y.

24-28 International Heating and Ventilating Exposition, New York, N. Y.

31 Canadian Electrical Association, annual winter conference, Montreal, Can.

FEBRUARY

1 Canadian Electrical Association, annual winter conference, Montreal, Can.

7-12 National Electrical Manufacturers Association, New York, N. Y.

APRIL

20-30 National Electrical and Radio Exposition, New York, N. Y.

MAY

2-5 Engineering Committees, Edison Electric Institute, Edgewater Beach Hotel, Chicago, Ill.

9-13 National Fire Protection Association, Atlantic City, N. J.

22-26 National Electrical Wholesalers Association, Hot Springs, Va.

JUNE

7-9 EDISON ELECTRIC INSTITUTE, Atlantic City, N. J.

22-24 Canadian Electrical Association, annual convention, Seigniory Club, Province of Quebec, Canada.